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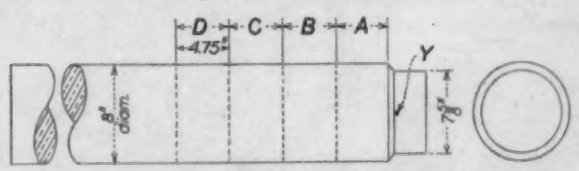
Composition of High Speed Tool Steel

Notable Tests on What Are Called the Superior Group—The Four Classes of Tool Steels and Some Record Performances

BY E. T. EDWARDS

Improvements in iron and steel making for the last several years have been of a broad character. Two branches of development are especially noticeable: 1.—The application of electricity to the production of metals by means of the electric furnace. 2.—The progress being made in the methods of heat treating high-speed steel and the changes in composition of the latter. The composition of present day high-speed steels and their cutting qualities form the theme of this paper.

The history of high-speed steel began when patents were granted to Messrs. Taylor and White, in 1900, covering the manufacture of a brand of steel alloyed with tungsten, molybdenum and chromium in specified proportions and certain exacting heat treatments for them. Well remembered are the remarkable demonstrations of this steel made by the Bethlehem Steel Company at the Paris exhibition. Tools for cutting metals were shown operating at a speed eight to ten times greater than what was then the usual shop practice. Engineers watched these tests with the keenest interest, and Messrs. Taylor and White were highly commended for their achievements. But note the rapid trend of events. A decade has passed since this remarkable steel was patented; today it is not heard of. At a comparatively recent date the patents covering this product were held invalid, the court saying, with other comments, that "no satisfactory basis appears in the records for the assertion that the patents in suit lead up to or were the means of producing or introducing the present high-speed steels."



Dimensions of Test Bar, Showing Points Where Cutting Speed is Increased

Imminence of Heavier Machine Tools than Ever

Steel-makers, encouraged with the success of this new steel, soon followed with superior steels that taxed the capacity of the machine tools in using them to their limit. This has necessitated improvements in machine design. Developments along this line of engineering have advanced to the stage where machine tools are now designed specifically to secure a high efficiency through rapid production at highest speeds with the greatest depth of cut and maximum feeds that the high-speed steels are capable of standing.

In a paper read recently before a railroad club in the West the author concluded by saying: "The makers of machine tools have had to wake up to the fact that heavier and more powerful machines must be made to keep up with the working capacity of high-speed steel, and I venture to prophesy that heavy machinery is as yet in its infancy." This prophecy is proving true, for day after day we see ponderous and more efficacious machines turned out by the various machine tool builders and the end is not yet.

Four Eras of Steel Cutting Tools

Without referring to any scientific classifications of cutting tools of the various types of steel, let us for a moment compare the composition of the Taylor & White steels with those of later years and also present day practice. Before we proceed in making this comparison, however, it seems necessary to refer to Mr. Taylor's groupings of high-speed steel historically, so that a better understanding may be had of the steels referred to.

"Group A is known as the era of carbon steels up to 1894.

"Group B is known as the era of Mushet or self-hardening steels, 1894 to 1900.

"Group C is known as the era of high-speed steel from 1900 to ——"

The time left blank after 1900 by Mr. Taylor has now closed and a new era has been reached. This we will group under D and call the era that of Superior high-speed steels. The old era closed and the new era began when Dr. Arnold made the startling announcement in England, early in 1909, that a new high-speed steel had been discovered that would do from four to seven times the amount of work done by other high-speed steels and at increased speeds.

Relative to the composition of these various steels, Mr. Taylor, in his application for a patent, says: "I have not found any very material difference in the cutting speed when chromium, tungsten and molybdenum are used in excess of the percentages last given. (Tungsten present in the proportions of one or more per cent.; or in the alternative, molybdenum present in the proportion of one or more per cent.; or again, tungsten present in the proportion of 2 per cent., or over, together with molybdenum in the proportions of one per cent. or over.) For cutting very hard metal I have found a tool composed of a steel having not less than 3 per cent. chromium and not less than 6 per cent. tungsten, or in the alternative, not less than 3 per cent. molybdenum, to have a special value. I have worked with steels containing carbon 0.85 to 2 per cent. without notable difference in the character of the tool produced by my treatment."

Percentage of Various Elements in Steels Succeeding the Taylor & White Steels.

No.	C.	Si.	Mn.	Cr.	Tung.	Mo.
1	0.41	0.10	0.07	3.11	9.00	...
2	0.53	0.19	Trace	6.13	11.07	...
3	0.60	0.20	0.15	6.00	12.00	0.50
4	0.59	0.30	0.20	4.00	13.00	...
5	0.40	0.10	0.15	5.00	13.98	...
6	0.77	0.11	0.19	3.17	16.57	...
7	0.71	0.36	0.06	3.48	17.53	...
8	0.79	0.20	0.10	3.50	....	9.26
9	0.97	0.10	0.26	6.03	18.00	...

The Taylor & White steels were soon followed by

steels made by the leading steel-makers, in which the composition varied widely. The foregoing analyses show relatively how the leading brands compared.

Again the compositions have changed and we are confronted with steels containing elements in the proportions as tabulated below. These are representative samples of the present day Superior high-speed steels.

Records of Performance of High Speed Steels

It is just as interesting to note the increase in the feed and speed of today over those of previous years as it is to compare the changes made in machine design and composition of steel. Instances of record on the cutting speed of the Taylor & White varieties of steel refer to these as cutting cast iron on a planer at 50 ft. per minute and on a lathe at 70 ft. per minute. On soft steel speeds of 50 to 60 ft. per minute are recorded on cuts of 0.04 sq. in. area; and speeds of 70 to 80 ft. per minute on cuts of 0.02 sq. in. area are also recorded.

Among recent records made by the group C steels are the following: A high-speed steel tool, 3 x 1½ in. in section, not long ago turned at 14 ft. per minute with ½-in. feed and 7/16 in. depth of cut a pair of locomotive tires in 43 min. The tools were taken out in good condition. A 1¼-in. square tool turned an open-hearth steel forging made from high chrome steel, annealed, at 66 ft. per minute, with ¼-in. feed and ⅝-in. depth of cut. Eight to 12-in. diameter chrome steel shafts are regularly turned at 35 ft. per minute, reducing the diameter ¾ in. per cut and feeding at about ⅛ in. per revolution of lathe. Finishing cuts ⅛ in. deep with 0.1-in. feed were regularly taken on the same steels at 90 to 95 per minute.

Percentage of Various Elements in Present Day Superior High Speed Steels.

No.	C.	Si.	Mn.	Cr.	Tung.	Mo.	Va.
1	.....0.60	0.07	0.29	4.53	19.65	....	0.03
2	.....0.65	0.10	Trace	3.23	16.78	....	0.25
3	.....0.73	0.32	0.18	3.24	18.27	....	0.35
4	.....0.67	0.22	Trace	5.33	18.51	1.52	0.42
5	.....0.69	0.23	0.20	3.25	16.68	....	0.64
6	.....0.60	0.20	0.17	5.50	16.00	0.50	0.70
7	.....0.52	0.16	0.12	2.77	16.95	0.37	0.83
8	.....0.80	0.31	0.18	3.06	18.43	....	0.90
9	.....0.64	0.25	0.21	4.06	18.80	0.97	0.92
10	.....0.59	0.18	0.12	3.50	18.56	0.22	1.06
11	.....0.71	0.45	0.25	3.24	16.72	0.20	1.16
12	.....0.71	0.35	0.15	3.78	18.92	....	1.25

The Performance of the Superior High Speed Steels

In these operations the cutting point of the tools for some time before failure discolored to the same degree as they would had they been heated to 650 deg. F., which shows the wonderful cutting properties even of this class of steel. Large amounts of these steels are still used, but they are being rapidly replaced by the new Superior brands. It has been said, in forecasting the future of the high-speed steel industry, "that it will probably pay better to produce tools from cheaper materials than those now used, that will run at a little less than the present degree of temperature to produce failure, than to experiment with costly alloys that may be found to work at rather higher temperatures." The author does not not agree with this forecast; an illustration taken from every-day practice will show the fallacy of its reasoning.

Composition of Tool Steels Tested.

No.	Carbon	Tungsten	Chrome	Vanadium
1	.....0.54 per cent	10.35 per cent	5.20 per cent	none
2	.....0.53 "	11.40 "	6.15 "	"
3	.....0.55 "	14.59 "	5.50 "	"
4	.....0.50 "	16.00 "	4.00 "	"
5	.....0.61 "	17.15 "	3.90 "	"
6	.....0.60 "	18.11 "	4.51 "	"
7	.....0.61 "	17.49 "	4.90 "	"
8	.....0.61 "	17.15 "	6.15 "	"
9	.....0.59 "	19.95 "	4.75 "	0.15 per cent
10	.....0.64 "	20.03 "	4.76 "	0.27 "
11	.....0.94 "	18.40 "	4.45 "	0.40 "
12	.....0.88 "	16.00 "	5.90 "	0.15 "
13	.....0.66 "	20.25 "	4.93 "	0.60 "
14	.....0.68 "	18.00 "	3.50 "	0.85 "

A 15/16-in. diameter Superior steel drill in test did the work that four regular high-speed drills would do, the drill only wearing about one-fourth as fast, while the speed and feed were increased 50 per cent. The Superior drill was useless after drilling 6100 ft. of material, the actual time required to perform the work being 490 hr. It was necessary to use two class C drills to do the same work, the time required being 762 hr. The Superior drill cost $3.05, while the class C drills cost $2.54 each. A recent test for drilling cast iron with a Superior steel drill is reported as follows: A 1-in. drill running at 520 r.p.m., with 1/16-in. feed, drilled two holes through a 4-in. block of cast iron and the drill had not perceptibly worn; this seems to be about the fastest on record.

Series No. 1 of Tests on the Cutting Qualities of High Speed Steel

Tool No.	Cutting speed in ft. per minute 46	54	62	70	78	86	94	Total length of cut, ft.	Remarks
1	150	150	150	30				480	Tool cut rough.
2	150	150	150	45				495	Tool burned out.
3	150	150	150	150	30			630	Tool burned out.
4	150	150	150	150	15			615	Tool cut fair.
5	150	150	150	150	30			630	Tool cut fair.
6	150	150	150	150	0			600	Tool did not cut well.
7	150	150	150	52½				502½	Not good.
8	150	150	150	150	150	0		750	Good tool.
9	150	150	150	150	7½			607½	Did not cut smooth.
10	150	150	150	150	150	150	0	900	Tool burned out.
11	150	150	150	150	0			600	Tool burned out.
12	150	150	150	150	150	150	60	960	Made clean smooth cut
13	150	150	150	150	150	150	120	1020	Chips deep blue.
14	150	150	150	150	150	150	74	974	Chips deep blue.

NOTE.—0, means the total failed when the speed was increased. 150, means a cut of 150 circumferential feet was taken before speed was increased. Numerals less than 150, given under any speed, means that the tool cut the distance indicated at that speed, then burned out.

The Part Played by Vanadium

As is commonly noted, whenever an important work is accomplished or discovery made, a theory soon follows setting forth a reason for the event. This has been true of high-speed steel also, as numerous theories have been given explaining that the results attained could be expected. It cannot be denied, however, that Messrs. Taylor and White have paved the way for the development of the present Superior steels, whether it be conceded that they made a wonderful discovery or simply adopted an experimental rule that permitted them to surpass others in the race for its development.

By referring to the analyses of the now leading high-speed steels it will be noted that at least one element has been added to all steels; this element is vanadium. It is universal practice to use it; all the leading brands of steel contain various amounts. Broad claims are made as to the wonderful results following its use. Among other things it is said vanadium has triple force in cleansing, strengthening and toughening all varieties of steel and that it intensifies tremendously the powers of other elements. In other words, "it endows steel with life."

The author's experience with the use of vanadium has led to the adoption of the following rules which show the important part played by this element and how much it augments the properties that make for speed and endurance. Stating the effect of vanadium as an average of many tests, these results show that:

0.3 per cent. vanadium allows 10 per cent. increased speed or 10 per cent. more metal removed in same time.

0.6 per cent. vanadium allows 20 per cent. increased speed or 20 per cent. more metal removed in same time.

0.9 per cent. vanadium allows 30 per cent. increased speed or 30 per cent. more metal removed in same time.

Stating the effect in terms of increased time between grindings of tools proves that:

0.3 per cent. vanadium doubles the time between regrinding.

0.6 per cent. vanadium quadruples the time between regrinding.

0.9 per cent. vanadium cuts eight times as much metal between grindings if the same speed and feed is used.

A tool that will cut at 10 per cent. faster speed will last twice as long between grindings (if the speed is not changed) and a tool that will stand a 20 per cent. faster speed will run four times as long between grindings. A tool that will stand 30 per cent. faster speed before it reaches the breaking-down point will last eight times as long without re-sharpening. To make this clear each additional 0.3 per cent. vanadium adds 10 per cent. to the

Series No. 2 of Tests on the Cutting Qualities of High Speed Steel

Tool No.	Cutting speed in ft. per minute 46	54	62	70	78	86	94	Total length of cut, ft.	Remarks
1	150	150	150	150	90			690	Tool burned out.
2	150	150	150	0				450	Tool burned out.
3	150	150	150	150	40			640	Tool burned out.
4	150	150	150	150	150	0		750	Fairly smooth cut.
5	150	150	150	150	150	20		770	Fair, tool burned out.
6	150	150	150	150	150	0		750	Burned out.
7	150	150	150	150	150	7½		757½	Cut not smooth.
8	150	150	150	150	150	60		810	Good, smooth cut.
9	150	150	150	150	150	150	0	900	Tool burned out.
10	150	150	150	150	150	150	60	960	Smooth cut, burned out
11	150	150	150	150	150	126		877	Fair.
12	150	150	150	150	150	150	80	980	Smooth cut.
13	150	150	150	150	150	150	164	1064	Smooth cut.
14	150	150	150	150	150	150	309	1209	Smooth cut.

possible cutting speed or doubles the life of a tool working at the same speed and feed. As a result of these data it is apparent that it is not policy to use the old high-speed steels. If the machinery is not strong enough to run at increased speeds, the tool will last eight times as long since it needs to be sharpened only one-eighth as often in removing a given amount of metal.

Much has been said and written about Mr. Taylor's paper, "The Art of Cutting Metals." It is certainly a masterpiece, based as it is on the longest and most exhaustive series of experiments conducted along this line. However, it would be impractical as well as almost impossible for the tool steel manufacturer to carry on experiments of this kind, day after day in the plant, to determine what composition of steel gives the best results under average shop conditions; yet it is necessary for the manufacturer to determine these things in order to keep abreast with the times. Nor does the tool steel testing machine* designed by Ed. G. Herbert give all that is desired.

Author's Method of Testing Tool Steels

A method used by the author, and with excellent success, can be briefly described as follows: For making tool tests a large variable-speed lathe driven by a 15-hp. direct-connected Westinghouse motor is used. The lathe is so connected by interchangeable gearing that 144 changes of

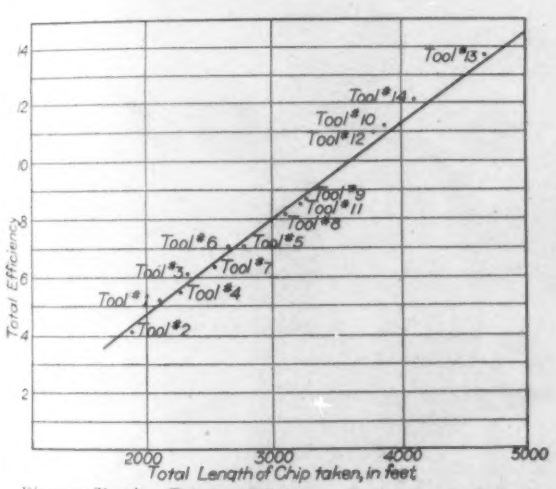


Diagram Showing Relative Efficiency of Various Tool Steels

Summary of the Four Series of Tests, Showing Total Length of Chip for Each Brand of Tool

Tool No. 1	2128 ft.	Tool No. 8	3100 ft.
Tool No. 2	1972 ft.	Tool No. 9	3225 ft.
Tool No. 3	2440 ft.	Tool No. 10	3915 ft.
Tool No. 4	2225 ft.	Tool No. 11	3194 ft.
Tool No. 5	2817 ft.	Tool No. 12	3814 ft.
Tool No. 6	2782 ft.	Tool No. 13	4607 ft.
Tool No. 7	2559 ft.	Tool No. 14	4163 ft.

speed can be obtained. The tools to be tested are ground to a templet so that absolute uniformity of clearance, rake and shape is always assured. The tool, when set in the lathe, is always set at exactly the same hight, this being about 1/16 in. above the lathe center, as experience has taught that this always gives the best results on a large diameter bar, such as is used. Extreme care is taken in hardening that all tools are heated under conditions as nearly uniform as possible, that they are held at the same level in the hardening bath, and that they are transferred to the air blast to cool thoroughly under exactly uniform conditions, the method of hardening being to heat the tool to the proper temperature in a clear coke fire, then to harden by immersing one-half of the cutting point in oil and finally to cool in an air blast.

The bars on which tests are made are of a special definite-composition alloy steel. They are first annealed and then heat treated to a uniform tough structure, of the same hardness, from the surface to the centre of the bar. The bars are made 8 in. in diameter and are discarded after the diameter has been reduced about 5 in. In making the tests the depth of cut is set at 3/16 in. on a side; the feed is also set so that it is constant at 1/15 in. per revolution. The cutting speeds are then varied until the tool is worn out and the test completed.

*An excellent description of this machine, and the results obtained from its use, can be found on pages 206 to 245 of the number 1 edition, 1910, Journal of Iron & Steel Institute.

Series No. 3 of Tests on the Cutting Qualities of High Speed Steel

Tool No.	Cutting speed in ft. per minute 46	54	62	70	78	86	94	Total length of cut, ft.	Remarks
1	150	150	150	52				502	Tool burned out.
2	150	150	150	67½				517½	Tool burned out.
3	150	150	150	150	0			600	Tool burned out.
4	150	150	150	150	145			545	Tool burned out.
5	150	150	150	150	150	150	0	900	Cut fair.
6	150	150	150	150	150	52		802	Tool burned out.
7	150	150	150	150	150	40		790	Tool burned out.
8	150	150	150	150	150	150	0	900	Fair.
9	150	150	150	150	150	150	7½	907½	Fair.
10	150	150	150	150	150	150	210	1110	Good cut.
11	150	150	150	150	150	150	17½	917½	Good cut.
12	150	150	150	150	150	150	157½	1057½	Not smooth.
13	150	150	150	150	150	150	211½	1128½	Good, smooth cut.
14	150	150	150	150	150	150	45	945	Good, smooth cut.

The method of procedure is this: After the tools are ground properly to gauge and hardened uniformly, they are set securely in the lathe, the lathe having been previously set so that the proper depth of cut and amount of feed result as soon as the cut is started. The tool then starts to cut at 46 ft. per minute; this speed is maintained until the tool has traversed 150 ft. in circumference along the surface of the bar. Then the speed is immediately increased to 54 ft. per minute; it is then increased in increments of 8 ft. per minute after each 150 ft. of circumferential travel, until a speed is reached where the tool fails or breaks down. It is considered that a speed of 94 ft. per minute, turning the special alloy bars used for testing purposes, is far greater than would be met in shop practice except in the most exceptional cases; when this speed is attained the tool is permitted to operate as long as it stands the work, or in other words until it burns out. The tool is then reground and the same cycle of tests is repeated until the tool again fails. The strictest precautions are taken in grinding so as not to blue the cutting edge or point of the tool. These tests are repeated until each tool has had four grindings; experience indicates that a tool usually gives the best results after the second grinding.

The sketch on page 957 will help to make clear the method of procedure. The tool is started at the point Y and cuts the distance A along the shaft, at 46 ft. per minute. This distance is 4.75 in., the diameter of the shaft being 8 in. before the cut is taken, and corresponds to the cut-length of 150 ft.; the feed being 1/15 in. per revolution of lathe. When the distance A has been completed the speed is immediately increased to 54 ft. per minute and the distance B is turned, when the speed is again increased to 62 ft. per minute and the distance C completed. The speed is increased in increments of 8 ft. per minute in this manner until a speed of 94 ft. per minute is attained, as before stated. The tool is permitted to cut at the latter speed until the point is destroyed.

Records of Tests Made by the Author

The record of tests will also illustrate the method of testing. These were tests precedent to a large number that were made to determine: 1.—The effect of high or low carbons on the cutting qualities. 2.—The results secured from varying the chrome present. 3.—The effect of high or low tungsten. 4.—The effect of the presence of varying amounts of vanadium. The carbon, tungsten, chrome and vanadium present in each tool were as given in the second table, first column, page 958, and they are branded by numbers for proper identification.

To estimate the value of each tool, we assume the formula for efficiency given on the next page.

Series No. 4 of Tests on the Cutting Qualities of High Speed Steel

Tool No.	Cutting speed in ft. per minute 46	54	62	70	78	86	94	Total length of cut, ft.	Remarks
1	150	150	150	6				456	Burned out.
2	150	150	150	150	10			610	Burned out.
3	150	150	150	120				570	Burned out.
4	150	150	15					315	Burned out.
5	150	150	150	67½				517½	Burned out.
6	150	150	150	150	15			615	Burned out.
7	150	150	150	60				510	Burned out.
8	150	150	150	150	40			640	Burned out.
9	150	150	150	150	150	60		810	Burned out.
10	150	150	150	150	150	150	45	945	Cut smooth, burned out.
11	150	150	150	150	150	50		800	Burned out.
12	150	150	150	150	150	67½		817½	Burned out.
13	150	150	150	150	150	150	495	1395	Good, smooth cut.
14	150	150	150	150	150	150	135	1035	Good, smooth cut.

$$\text{Efficiency} = \frac{A \times S^3 + L\ (1000)}{1000}$$

where—

A = area of chip; S = average cutting speed at which the tool failed; L = average length of cut taken at speed S. The efficiency of each tool from this formula, is then as follows:

Relative Efficiency of the Different Brands

Tool No. 1	5.30	Tool No. 8	8.26
Tool No. 2	4.28	Tool No. 9	8.64
Tool No. 3	6.06	Tool No. 10	11.36
Tool No. 4	5.61	Tool No. 11	8.57
Tool No. 5	7.20	Tool No. 12	11.05
Tool No. 6	7.05	Tool No. 13	13.52
Tool No. 7	6.42	Tool No. 14	12.14

The accompanying efficiency curve is drawn from these results and illustrates graphically the relation of each tool. In these series of tests special attention was attracted to the last four tools, Nos. 11, 12, 13 and 14, as these tools continued to cut at the highest speeds. The extreme point attained a temperature that was distinctly "red in shaded shop light."

It must be borne in mind that these tools and all the tools tested, rfom which the results are given relative to the effect on the cutting qualities of various amounts of vanadium, were hardened under the conditions generally in use in shop practice. The method of hardening any tool steel exerts an enormous influence on the cutting qualities of that steel, as by heating to lower or higher temperatures or by varying the temperature or nature of the cooling bath, the character of the steel will without fail be altered. It will be found, however, in performing a series of tests that the tools giving the best results under one condition of hardening will invariably give the best results under all practical conditions of hardening.

Indications are that high-speed steel tools containing vanadium will run much longer between grindings in proportion to the quantity of vanadium they contain up to 1.25 per cent. Tools containing larger amounts than this have been used, but the added efficiency does not seem to warrant the extra expense of manufacture, excepting for special cases.

Terne Plate Made from American Ingot Iron

The American Rolling Mill Company has erected six tinning stacks at its Zanesville plant for the manufacture of terne plate, with American ingot iron as a base metal. This plant has just begun operations and the company is confident that, judging by the great demand for American ingot iron sheets, roofing and formed products, there will be a brisk demand for ternes made from this pure iron, because of its demonstrated durability. The plant will have a capacity of 600 to 1000 tons per month.

The production of pure iron in No. 30 gauge black plate is a noteworthy accomplishment, because, due to the great and exceptional purity of the metal, the sheets weld together at the rolling temperature. It has been quite a problem to manufacture No. 26 successfully and the solving of this problem is expected to open up many new fields for this popular product.

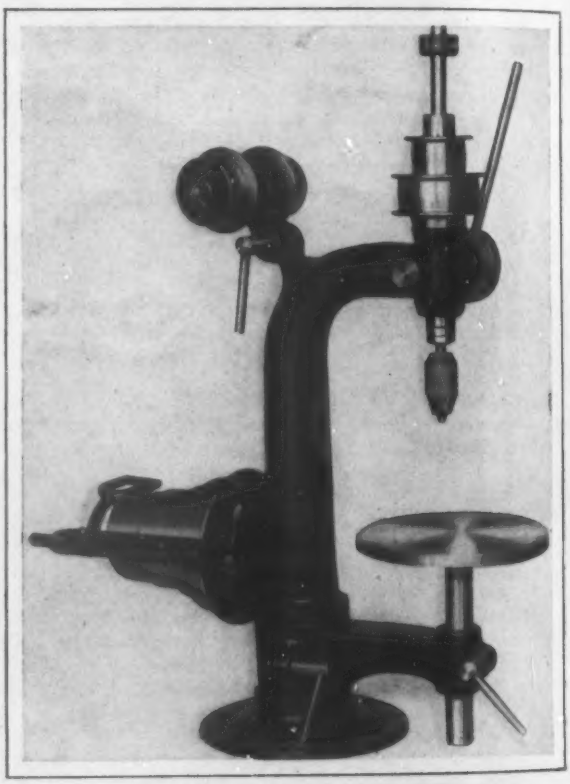
The tinning department is under the supervision of some of the oldest tin men in the country, many having learned the art in Great Britain. The genuine Moorewood method of applying a pure lead and tin coating has been adopted. This produces the genuine old style, palm oil, hand-dipped process terne plates that have given such great satisfaction in the past. Armco Old Style and Armco Extra Coated are the only two brands that will be produced, the first-named in 40, 30 and 25-lb. coating, palm oil finish, and the second in 20, 15 and 10-lb. coatings, palm oil finish. The first order was placed by the Irwin Mfg. Company, Pittsburgh, Pa., and was for 1000 cases. This plate, it is stated, will pass the United States Government specification.

A power show, conducted under the auspices of the New England Association of Commercial Engineers, is to be held in Mechanics Building, Boston, Mass., April 22 to 27 inclusive. The list of exhibitors includes manufacturers from all over the United States of power producing machinery, accessories, appliances and supplies. Turbine engines, pumps, compressors and many other types of machines will be shown in operation.

A New Sensitive Bench Drilling Machine

A sensitive bench drilling machine with the chuck directly fitted to the spindle is being built by the Monarch Machinery Company, 249 North Third street, Philadelphia, Pa. This arrangement is somewhat of a departure from the established standards of equipping this class of tool and it is pointed out that the inconvenience of fitting drills to the spindle or special holder is avoided, as the chuck will accommodate drills of all sizes within the range of the machine.

Steel is employed for the shaft and the pinion, which are made in one piece, and the feed is by a hand lever, a vertical movement of 4 in. being available. The three-jaw chuck will accommodate drills having a maximum diameter of ¼ in. and is held on the spindle by a long thread. The end thrust of the spindle is taken up by a ball bearing. The table is 8 in. in diameter and swings through



A New and Improved Type of Sensitive Bench Drilling Machine Having the Chuck Fitted Directly to the Spindle Built by the Monarch Machinery Company, Philadelphia, Pa.

an arc of 180 deg. The vertical movement of the table is 7 in. and the top is ground in alignment with the spindle.

The tool is belt driven and the countershaft is attached to the body of the drill. A two-step cone pulley provides two speeds and an adjustable idler takes up the slack. Loose pulleys are also provided on the countershaft in addition to the driving pulleys, and all of them, including the idlers, have flanges. The machine will drill to the center of a 10½-in. circle. Its over-all hight is 27 in. and the crated weight is 80 lb.

A portable floor crane and hoist, designed originally to meet the needs of its own shop to handle heavy loads, is being manufactured by the Canton Foundry & Machine Company, Canton, Ohio. A floor crane is almost indispensable in a shop where heavy handling is necessary, and its use is found to be a saving of labor in machine shops, automobile factories, garages and various other manufacturing plants and repair shops. The crane is built for hard service, but can easily be moved from one part of the shop to another, being mounted on wheels with roller bearings. The chain is hand forged, the hook is a drop forging, the block is of cast steel and the gears are cast iron. The crane is built in 8 sizes, ranging in hight from 5 ft. 8 in. to 12 ft. 6 in., with a lift ranging from 4 ft. 6 in. to 11 ft. 3 in. and a capacity of from 3000 to 8000 lb.

New Triplex Pumps

Details of Two Recently Developed Types of the Goulds Mfg. Company

A line of triplex plunger pumps has been recently placed on the market by the Goulds Mfg. Company, Seneca Falls, N. Y. They are made in both the single and the double-acting styles and are intended for general water supply, municipal water works, fire service, sprinkler systems, hydraulic elevators, pulp grinders, condenser service, or any situation where large quantities of water against moderate pressures are required. The single-acting type of pump is illustratd in Fig. 1 and a view of one of the double-acting type arranged for motor drive is given is Fig. 2.

The pressure range of the single-acting pump, one of which is shown in Fig. 1, is from 65 to 100 lb. and the capacity is from 428 to 960 gal. per minute. These pumps are built in six different sizes. The three smaller ones have plunger diameters of 10, 11 and 12 in. respectively, and a common stroke of 10 in. The next two sizes of pump have a 12-in. plunger, while the largest has a plunger 14 in. in diameter. The stroke of these three pumps is 12 in. The speeds of these two groups of pumps are 42 and 40 r. p. m. respectively. The ratio of gearing in the first three pumps is 5.3 to 1 and 5.6 to 1 in the others. The diameters of the suction pipes are 7, 8, 10 and 12 in., and the discharge pipe diameters range from 6 to 10 in.

The frame of this type of pump consists of two standards bolted to the base and held in alignment by a center cross-head guide bolted between them, an arrangement which, it is pointed out, gives a rigid foundation for the working parts. The crankshaft, which is of open-hearth high-carbon steel, is machined to gauge and is journaled in phosphor-bronze bearings. Babbitt metal is employed to line the bearings of the pinion shaft. The gearing, which varies in ratio from 5.3 to 1 to 5.6 to 1, is of charcoal iron for the large gear and forged steel for the pinion, the teeth of both members being cut from the solid. The pinion and the adjacent teeth of the gear are covered by a gear guard. The cross-heads have adjustable bronze shoes which run in bored guides. Strap head and wedge adjustment with bronze boxes at the crank end and adjustable bronze boxes of the marine type at the cross-head end are provided for the connecting rod. The plungers are of hard cast iron and are finished by grinding.

Charcoal-iron castings are used for the cylinders and the valve boxes, the former being cast integral with the base. Each valve box is a separate casting containing a set of suction and discharge valves, which are rubber disks on bronze grid seats with cylindrically wound springs.

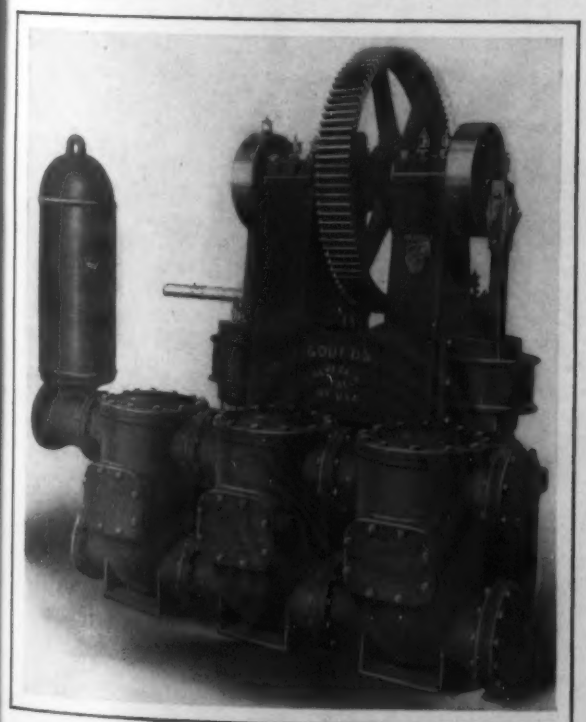


Fig. 1—One of the New Single-Acting Triplex Pumps Built by the Goulds Mfg. Company, Seneca Falls, N. Y.

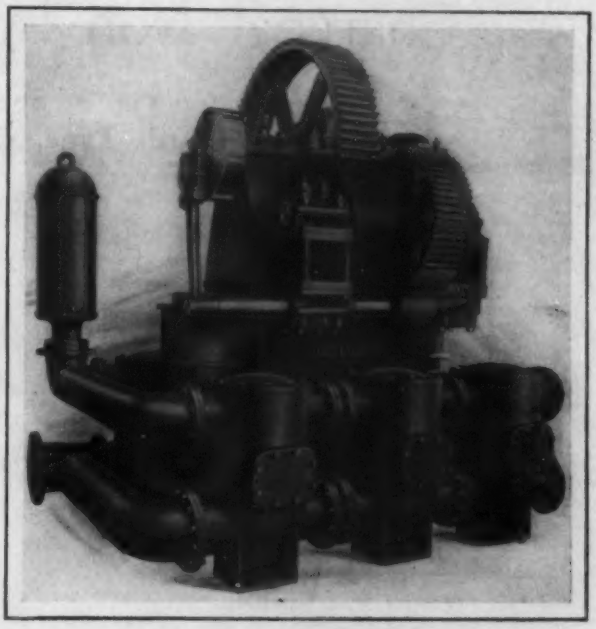


Fig. 2—The Standard Double-Acting Pump Fitted for Motor Drive

The connections to the sections and discharge pipes can be made at either end of the pump.

The double-acting triplex piston pump, which is illustrated in Fig. 2, arranged for motor drive, can be also furnished with a belt drive. This pump is designed for a working pressure of 150 lb. and is made in ten sizes ranging in capacity from 175 to 1525 gal. per minute. These pumps are divided into four groups according to their speed, which ranges from 45 to 38 r. p. m. All but the two largest sizes of pumps have a frame which consists of two standards which are bolted to the base and are kept in alignment by a center guide bolted between them, which is the same construction as that employed in the single-acting type. In the other two sizes the standards which are held together by a center cross-head guide and cylinder seat bolted between them rest upon foundations and carry the end cylinders. The general construction of these pumps is practically the same as the single-acting ones except that the connecting rods are of forged steel and are fitted at each end with adjustable bronze boxes of the marine type. The cylinders are separate charcoal-iron castings bolted to the base and have bronze linings bolted in place, an arrangement which makes them readily removable. The iron pistons have followers and are fitted with fibrous packing. The piston rods are high grade cold rolled steel and the stuffing boxes and glands are of bronze fitted with fibrous packings. These are readily accessible for making adjustments. The suction and discharge valves are rubber disks on bronze grid seats with cylindrical springs and a set of each is contained in the valve boxes, which are separate castings of charcoal iron.

"The Evolution of Iron to Steel, or the Regeneration of the Republic Iron & Steel Company," is the title given to a generously illustrated article in Harper's Weekly for April 6. It outlines the growth of the Republic Company and describes from a popular standpoint present day steel-making operations. The author, John R. Rawlins, pays a tribute to Chairman John Alexander Topping, mentioning his reorganization of the La Belle Iron Works, Steubenville, Ohio, and of the Tennessee Coal, Iron & Railroad Company, and to President Thomas J. Bray, "an engineer, metallurgist and business man, . . . the active man on the firing line."

The Standard Steel Company, Bedford, Ohio, is enlarging its plant and arranging for the production of polished steel sheets which, by means of a special process, will be uniformly blue in color. These will be used for the manufacture of stoves, etc. The company is also adding equipment for cold rolling, pickling and annealing sheets. It expects to provide later for the production of planished sheets. Its plant will be put in operation in about 30 days.

Charcoal Iron by a New Process

Purification in a Special Furnace of the Open Hearth Type, Blast Being Introduced Through Tuyeres in Front and Back Walls

A new process of manufacturing charcoal iron, invented by J. Jones Hudson of Philadelphia, is being successfully operated by the Vulcan Charcoal Iron & Steel Company, at Crum Lynne, Pa., under the supervision of the inventor, who is general manager of the company. It consists in melting the charge between layers of charcoal in a specially designed furnace of the open hearth type. The furnace is pre-heated by means of oil or gas, and a thick bed of charcoal is provided upon which the charge is made. By the introduction of blasts of cold air through tuyeres, the metal is melted and boiled, filtering through the charcoal which consumes the impurities, eliminating them from the molten mass. Charcoal may be added at any time during the heat and is generally added near the end to dispel any injurious gases that may arise, thereby insuring complete purification of the metal. The method has the effect of purifying and refining the iron by decarburization and oxidation. It is stated that it may be applied to the manufacture of "charcoal steel" with equally valuable results.

The Furnace and Method of Working

The furnace at present employed at Crum Lynne is of 15 tons capacity. It has a basic lining and is fired at the ends by oil burners. In the front and back walls there are six tuyeres each, adjustably mounted, through which a blast of cold air under pressure is conducted into and on the charge as it melts. The character of the charge is regulated by the quality of the product to be produced, but in all cases both charcoal and flux are used in varying quantities, thereby increasing the heat and continuing the refining. Sulphur, phosphorus, silicon and other impurities are eliminated to an extent it is claimed "hitherto unknown in the manufacture of iron and steel, the mass being decarbonized until the analyses of the molten metal, which may be made from time to time, show the quality of iron required." The desired refinement being secured, the metal is tapped into a bottom-pour ladle and poured into ingots of various sizes, according to the kind of iron to be rolled, "and after it has received a surface chill it is given a wash heat in a suitable furnace or oven, and may then be passed directly to the mill, where it is rolled into plates, skelp, billets, or bars for tin plate, sheets, or other suitable shapes."

Fig. 1—Magnification 87 Diameters

Carbon	0.035	Slag (SiO_2)	0.035
Manganese	0.05	Sulphur	0.026
Silicon	0.012	Phosphorus	0.024

Results of Chemical and Physical Analyses

The charge usually consists of pig iron, cast iron, wrought iron or steel scrap, varied to suit conditions and the material to be produced. The following analyses of some of the heats show the results obtained:

Carbon.	Manganese.	Silicon	Sulphur	Phos.
0.04	0.05	0.016	0.024	0.022
0.035	0.08	0.026	0.035	0.028
0.03	0.07	0.023	0.034	0.034
0.03	0.06	0.019	0.032	0.014
0.025	0.06	0.053	0.032	0.016
0.03	0.05	0.016	0.039	0.028
0.04	0.07	0.021	0.024	0.024
0.04	0.11	0.017	0.030	0.022

Physical tests from one of these heats showed the following:

Elastic limit.	Tensile strength.	Elong in 8 in.	Red. of area.
27,700	43,200	27.25 per cent	69.6 per cent
29,600	45,000	25.5 per cent	75 per cent

These tests were from pieces of the crude metal in a runner, without any work done on them, and merely shaped into a test piece.

Comparative tests of the product of this company and the best grade of Swedish iron were made and resulted as follows:

	Swedish Iron.	Vulcan Charcoal Iron.
Carbon	0 10	0.03
Tensile strength	44430 lb	45,680 lb.
Elastic limit	27,200 l	30,420 lb.
Elongation	35.5 per cent.	33 per cent.
Reduction of area	67.5 per cent.	72.7 per cent.

A sample test cut from a tin plate bar made by the Vulcan company gave 29,080 lb. elastic limit, 48,700 lb. tensile strength, 22 per cent. elongation in 8 in. and 66.88 per cent. reduction of area.

Both the chemical and physical tests reveal excellent material but it is claimed that as soon as the unavoidable difficulties incident to the inauguration of a new process are entirely surmounted, a still better product will be turned out. The metal thus far produced has been made without the regulation of a chemist, the analyses above referrerd to being made in each case after the metal had been poured.

Comparison with Other Methods

In comparing the iron or steel made by the new process with that made by the old sinking fire method the following points are made:

The resultant metal contains no pieces of scrap or raw iron sunk into it unrefined.

Preliminary forging and shaping of the metal and rolling it into muck bars are done away with.

The old process depends too much on chance, no analysis being obtainable during manufacture, and the prevention of defects and the securing of a homogeneous product are not certain even with the best care.

In reality the scarcity of proper high-grade iron scrap has led to the substitution now of poorer steel scrap, making results by the old process by no means equal to those attained in former years.

The cost of production is cheaper than by the old process, making it possible to put on the market a reliable metal at a price that will encourage its use for purposes where charcoal iron is especially in demand.

The purifying action of charcoal in contact with molten metal is such as to give a product of higher grade than is possible in the usual process of making steel or so-called open-hearth iron.

It is the intention of the new company to produce charcoal iron or "charcoal steel" for the following purposes:

1. Tin plate bar, to be used in the manufacture of roofing tin plates. By varying the chemical composition of the product a "charcoal steel" is produced to meet

Fig. 2—Magnification 87 Diameters

Carbon	0.035	Phosphorus	0.026
Manganese	0.06	Tensile strength	45,000 lb.
Silicon	0.012	Elastic limit	29,600 lb.
Slag (SiO_2)	0.075	Elongation in 2 in.	25.5 per cent
Sulphur	0.030	Reduction of area	75 per cent
Fracture		Cup	

the above requirements. 2. Seamless boiler tubes. 3. Sheet bars for galvanizing, enameling and deep stamping. 4. "Charcoal steel" rails. It is claimed that the metal is of such purity that when recarburized and rolled into rails it will tend to solve the problem of brittle or defective rails. 5. Axles, cranks, forgings, etc., with special toughness and reliability.

The photomicrographs herewith presented give a fair idea of the general condition and structure of this charcoal iron and its freedom from oxides, except the slag usual in iron. Fig. 1 is taken from a crude runner and represents the metal just as it cools after being poured, revealing the low carbon content and the large ferrite crystals. Fig. 2 represents a piece of the same crude metal shaped under the hammer into a test piece. It shows the same low carbon content as represented by the small amount of pearlite and the compression of the ferrite crystals, due to hammering.

The electric equipment of a 28-in. blooming mill at the steel works of Dorman, Long & Co., Middlesbrough, England, is illustrated in an article in the General Electric Review for April, published at Schenectady, N. Y. The mill is run by a 1200-hp. direct current motor and this receives its current from a reversible generator. The generator is part of a two-unit flywheel equalizer set coupled to a 30-ton flywheel and driven by a three-phase motor from the general source of the electric power.

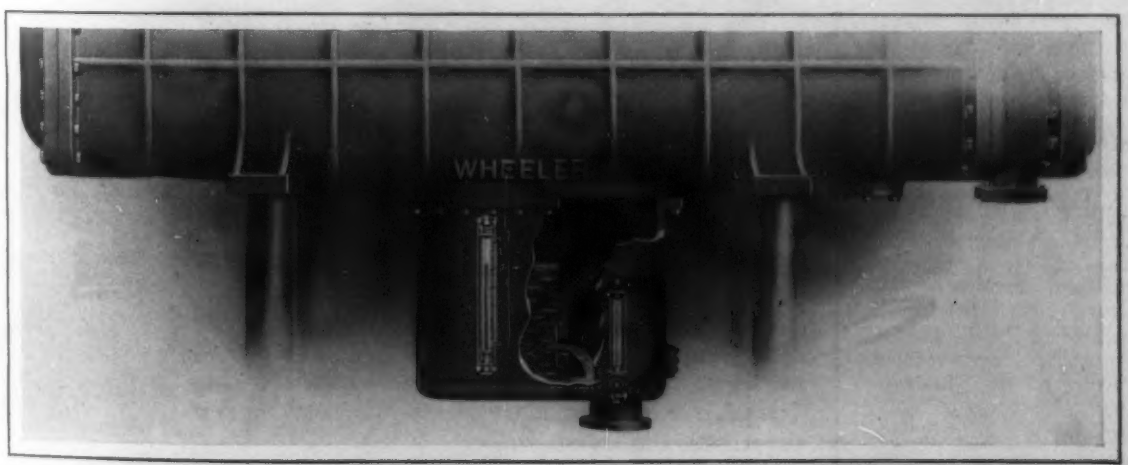
An Indicating Hot Well

Arrangement Used With Condenser for Ascertaining Steam Consumption

A new method of measuring the steam consumption of a turbo-generator is fursished by the indicating hot well which has been recently brought out by the Wheeler Condenser & Engineering Company, Carteret, N. J. This device is attached directly beneath the condenser, as shown in the accompanying engraving, and the opening in the bottom of the condenser is built so that condensate drains into the left chamber of the hot well, which communicates with the hot-well pump suction by an orifice in the dividing wall. The steam consumption of a turbine or engine can be determined by weighing the condensate from the surface condenser, but this method of measurement has not been adopted by many plants on account of the fact that the ordinary measuring or weighing devices are commonly not accurate, in addition to being costly and clumsy and adding to the expense of plant operation as well as the amount of piping required.

The indicating hot well, as will be noticed, is similar in size and appearance to the ordinary hot well and is attached directly to the bottom of the condenser and forms a part of the shell. In this way another valuable function is added to that portion of the power plant equipment which has for its purpose besides the maintaining of high vacuum, those of providing pure distilled water for the boiler feed and heating it to a high temperature, since now the measurement of the amount of condensate and the rate of steam consumption of the engine or turbine are also made possible.

The orifice employed in the hot well is formed in a brass plate inserted in the partition wall between the two portions of the hot well. It is polished and finished to insure accurate measurement of the flow and in addition an indicating gauge is attached to the shell of the hot well so that the head of water over the orifice can be easily read. As the velocity of discharge through an orifice of given diameter varies directly as the square root of the head and the quantity of water discharged is equal to the product of the velocity, the area of the orifice and the coefficient of contraction it is important that the head should be accurately determined. Ball check valves are provided in each fitting attaching the indicating gauge to the shell of the hot well, so that if the gauge glass should break, an inrush of air would be prevented and the gauge glass can be replaced at leisure. Another glass is also provided to show the hight of water in the hot-well suction compartment so that the water will not submerge the orifice. The scale attached to the indicating gauge at the left is calibrated to read directly in pounds of steam per hour. The graduations on each of these scales are specially etched for the orifice with which the scale to be used and each orifice is made independently and carefully calibrated. The accuracy of the scale is said to be within 2 per cent. throughout the entire range of readings and between 75 and 125 per cent. load the accuracy is within 1 per cent.



The New Indicating Hot Well Developed by the Wheeler Condenser & Engineering Company, Carteret, N. J.

National Metal Trades Association

Annual Meeting in New York Last Week Disclosing a Vigorous Program for Benefiting Industrial Conditions for Employee and Employer

Action of interest to manufacturers in general was taken at the annual convention of the National Metal Trades Association. It was voted to ask the co-operation of other organizations to form a national employers' council which shall discuss industrial conditions and recommend uniform action in matters pertaining to the maintenance of equitable conditions between employers and employees. Provision was made for proper representation of the Association in such a council should it be formed before the next convention. The Administrative Council was instructed to investigate organizing a mutual liability insurance company to furnish members of the Association with insurance covering systematic compensation in industrial accidents, report to be made at the next meeting. Much attention was given to industrial education, the aid of the National Government was urged and $4,000 was appropriated to further instruction along industrial lines.

Decision to act in the matter of a national employers' council and consideration of liability and compensation insurance were conspicuous features of the annual meeting of the National Metal Trades Association in the Hotel Astor, New York, April 11. The attitude of the association in these particulars was especially emphasized by Commissioner Robert Wuest, of the association, and is summed up in the resolutions adopted and here printed. The convention comprised two sessions, morning and afternoon, followed by the usual banquet in the evening, although much of the activities of the association was planned in the committee and other meetings on Wednesday, not to mention the annual gathering of the so-called alumni, Wednesday evening, when present and past members of the administrative body of the association presented a chest of silver to Retiring President F. C. Caldwell. At the association's dinner Secretary of the Treasury Franklin MacVeagh, W. Morgan Shuster, formerly treasurer of Persia, and Dr. Arthur A. Hammerschlag, director of the Carnegie Technical Schools of Pittsburgh, were the speakers, with Mr. Caldwell as toastmaster. About two hundred of the members of the association were registered and at the banquet seating accommodations were at a premium. The speeches were notable for their serious and highly informing character.

Resolutions of National Metal Trades Association

NATIONAL EMPLOYERS' COUNCIL

WHEREAS, Certain conditions in the labor world have arisen to make it advisable that our Association and others with like purposes join in the careful consideration of such conditions and prepare for future developments along these lines; now, therefore, be it

RESOLVED, That the President, Vice-President and Commissioner of our Association be appointed a Committee to take steps to promote the co-operation of other associations, to form a National Employers' Council, which shall have power to meet, discuss industrial conditions and recommend uniform action in and by the constituent associations, concerning the establishment of equitable conditions between employers and employees, and,

RESOLVED FURTHER that said Committee of our Association shall constitute the representation of our Association until its next convention in a National Employers' Council, in the event of the organization of such, with power to incur reasonable expense on behalf of our Association in carrying out the intent of this resolution.

INSURANCE PLAN

RESOLVED, That the Administrative Council be and is hereby instructed to investigate carefully during the ensuing year the feasibility and desirability of this Association forming a mutual liability insurance company for the purpose of extending to the members of the National Metal Trades' Association insurance covering systematic compensation in industrial accidents.

BE IT FURTHER RESOLVED, That the Administrative Council report fully on this subject to the next annual meeting of this Association.

Officers and Committees

At the close of the afternoon session officers were elected for the year as follows:

President, Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I.

First vice-president, W. A. Layman, Wagner Electric Mfg. Company, St. Louis, Mo.

Second vice-president, L. H. Kittredge, Peerless Motor Car Company, Cleveland, O.

Treasurer, Howard P. Eells, Bucyrus Company, Cleveland, O.

Councilors, term expiring 1914: George Mesta, Mesta Machine Company, Pittsburgh, Pa.; Herbert H. Rice, Waverley Company, Indianapolis, Ind.; Stevenson Taylor, Quintard Iron Works Company, New York; W. M. Taylor, Chandler & Taylor Company, Indianapolis, Ind.; Clarence E. Whitney, Whitney Mfg. Company, Hartford, Conn.; John W. O'Leary, A. J. O'Leary & Son Company, Chicago, Ill. Councilor to fill the unexpired term of L. H. Kittredge, promoted to a vice-presidency, P. B. Kendiz, Seneca Falls Mfg. Company, Seneca Falls, N.Y.

The councilors whose terms run over are: J. H. Schwacke, Wm. Sellers & Co., Inc., Philadelphia, Pa.; C. Bermingham, Canadian Locomotive Company, Ltd., Kingston, Ont.; W. H. Van Dervoort, Root & Van Dervoort Engineering Company, East Moline, Ill.; A. E. Newton, Prentice Bros. Company, Worcester, Mass.; P. O. Geier, The Cincinnati Milling Machine Company, Cincinnati, O. Honorary, M. H. Barker, The American Tool & Machine Company, Boston, Mass.

The convention was called to order by the retiring president, F. C. Caldwell, of H. W. Caldwell & Son Company, Chicago, Ill., and business expedited at once by dispensing with the rollcall and reading of the minutes, after which Mr. Caldwell announced the appointment of committees as follows:

Committee on Credentials.—F. J. Haynes, Franklin Manufacturing Company, Syracuse, N. Y., chairman; W. J. Davidson, Staten Island Ship Building Company, Port Richmond, N. Y.; W. S. Martin, Mead-Morrison Mfg. Company, Cambridge "A," Boston, Mass.

Committee on Resolutions.—H. W. Hoyt, Great Lakes Engineering Works, Detroit, Mich., chairman; E. W. Heyl, Heyl & Patterson, Inc., Pittsburgh, Pa.; W. W. Coleman, Bucyrus Company, South Milwaukee, Wis.; W. A. Layman, Wagner Electric Mfg. Company, St. Louis, Mo.; C. E. Whitney, The Whitney Mfg. Company, Hartford, Conn.

Committee on Constitutions.—P. B. Kendig, Seneca Falls, Mfg. Company, Seneca Falls, N. Y., chairman; Henry Ritter, The Lunkenheimer Company, Cincinnati, Ohio; H. I. Illingworth, Boston Machine Works Company, Lynn, Mass.

Auditing Committee.—Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I., chairman; George L. Markland, Jr., Philadelphia Gear Works, Philadelphia, Pa.; A. H. Bullard, The Bullard Machine Tool Company, Bridgeport, Conn.

Convention Committee.—W. C. Warren, S. L. Allen & Co., Philadelphia, Pa., chairman; C. E. Williams, New York Central Iron Works, Hagerstown, Md.; H. B. Kennedy, The Hoggson & Pettis Mfg. Company, New Haven, Conn.; F. Fosdick, The Fitchburg Steam Engine Company, Fitchburg, Mass.; Chas. B. Wilson, The Ferro Machine & Foundry Company, Cleveland, Ohio.

Report of the President

In the submission of his report for the year Mr. Caldwell said:

We have had a year of growth and prosperity. The excellent condition of our finances will appear from the report of the treasurer. You will be gratified to note the building up of a substantial reserve fund in accordance with the recommendation of our last convention. The prompt manner in which our membership has met the call for this reserve fund, in spite of the unfavorable business conditions, is a conclusive demonstration of their loyalty and their faith in the permanency of its objects.

The statistics of membership which will be submitted to you, when read in the light of the business situation during the past year, must cause great gratification that the condition is so satisfactory. Our association has consistently followed the policy of admitting to membership only those who are in entire accord with the principles for which we stand.

THE LABOR PROBLEM

Of the strikes of the year that for the 8-hr. day in the New York and New Jersey district is the most noteworthy. It would seem probable that the strike was actuated by a desire on the part of the union leaders to do something to demonstrate to the San Francisco manufacturers that there was some foundation for the claim that the 8-hr. day would be established within the time stipulated in the San Francisco agreement. However that may be, it is certain that the strike resulted in the complete defeat of the strikers. Incidentally, our association demonstrated the excellence of its organization and exemplified the fact that we have reduced the combating of strikes to the orderly routine of a smoothly run system.

HENRY D. SHARPE.

President National Metal Trades Association. After graduation in 1894 from Brown University, he spent three years in the works of the Brown & Sharpe Mfg. Company, Providence, R. I., before taking up for the company the executive work which he has since carried on

Our association stands as firmly as ever in its opposition to the attempts of labor unions to fasten upon the industries of this country uneconomic conditions which would make the situation of the employer and the self-respecting employee intolerable and bring certain destruction to the manufacturing interests of our country. So long as American labor unions, as a part of their fundamental purposes, insist upon the restriction of output, the limitation of apprentices, the minimum wage and the closed shop, and so long as they seek to shorten the work day on grounds other than real benefit to the industry and the workmen, and so long as they countenance violence as a means of obtaining their end, just so long will they be opposed by our association firmly and with unrelaxed vigilance.

The cause of industrial education is recognized as one of primary importance to our membership, and one that must not be neglected if our country is to maintain its standing among the industrial nations of the world. No great movement can prevail in this country without the support of public sentiment, and it is with satisfaction that those sharing our belief on these questions can discern the marked change in the attitude of the general public.

EMPLOYERS' LIABILITY AND COMPENSATION LAWS

Legislative action, especially in Congress, has received the careful and vigilant attention of your association, and much has been done to present to legislative bodies everywhere facts and arguments based thereon which were calculated to set forth clearly the attitude of our membership in matters affecting our interests. The passage of laws in many of the states upon the subject of employers' liability and the compensation of injured workmen is a subject that will receive attention at this convention. An indirect result of such legislation has been to emphasize the necessity for safeguarding our workmen from every possible injury. This movement has been actuated as much, or more, by a desire on the part of our membership to conserve the human resources of our industry and to do their full share in saving employees from the pain and hardship of accident, as it has been actuated by the possible damages that such legislation would fix upon the employer. The practical work of the employee of the association who has been detailed for the purpose of inspecting our plants and suggesting safety measures will certainly appeal to our membership and be welcomed as a most beneficial activity of the association.

HUMANITARIAN ATTITUDE OF ASSOCIATION MEMBERS

The spirit of the association never has been and never should be that of resisting changes in conditions or improvements in surroundings that would be of real benefit to our employees and to the industry that we represent. If there is any one thing that should be constantly before us as members of this association it is that the very power that the association undoubtedly possesses should be used to its fullest extent to make the condition of the men in our industry better than it possibly could be without the existence of our association. The duty is laid upon us with greater weight than it would be upon an independent manufacturer, to see that the working conditions surrounding our employees are as good as science and philanthropy can make them; that the opportunities for social and intellectual cultivation should be placed within easy reach of those of our men who seek such opportunity; that the pay that they receive should not merely be adequate for their necessities, but should be sufficient to attract the intelligence and skill of that high grade of American citizen, the mechanic who has made us an industrial nation; that the wages should not merely pay for a required service, but should carry with them a stimulus to ingenuity and intelligent activity without which work of any character is a mere treadmill task.

TRIBUTES TO MESSRS. WUEST AND COVELL

Your commissioner, as always, has displayed energy, efficiency and executive ability in the active conduct of the affairs of our association. I take this occasion to express my appreciation of his hearty co-operation in every effort made by the executive officers. I cannot pass this occasion without mentioning specifically the splendid service rendered by our ex-president, H. N. Covell, in giving unsparingly of his time and attention in assisting in the conduct of the New York strike during the temporary disability of our commissioner.

WORLD-WIDE SOCIAL UNREST

During the past year we have been astonished and disturbed at evidences of unrest throughout the world. Even in far-off conservative China the world has seen the establishment of a republic with a rapidity unprecedented in the world's history. The Socialists of Germany developed a strength in numbers and activities of purpose astonishing to citizens of that country, and even to the Socialists themselves. In England the government has been perplexed with the most difficult problems growing out of the social and economic conditions due to the congested state of the population. Our near neighbor Mexico seems unable to settle the results of the recent revolution. The general unrest has evidenced itself in our own country in a peculiar way. The attacks upon invested capital have increased in persistency, and have spread in extent until almost every industry in the country has felt the direct effects of this policy. How much the recent depression in business has been due to this element would be impossible to determine. We have had, in addition, presented for the consideration of our people, propositions affecting some of the fundamental working principles of our constitutional government. There seems to be a movement, large enough to be serious, looking toward the substitution of the general popular will for the constitutional checks and safeguard which were the foundation stones upon which the fathers of the republic based the fabric of our institutions.

The problems which we as an association have been endeavoring to solve are just as serious and just as important to the welfare of the country as any of the political problems that are now engaging our attention. If we are

right in our contentions, and we are certainly sincere in believing that we are right, our efforts in endeavoring to maintain the principles of this association are just as patriotic and just as beneficial to the welfare, not only of our industry, but the country at large, as the benefits that accrue from the right settlement of any great public question.

In the absence abroad of Treasurer Howard P. Eells, of the Bucyrus Company, Cleveland, O., his report, which showed the finances of the association to be in a satisfactory condition, was read by Robert Wuest, commissioner of the association. Mr. Wuest then presented his own report and in part said:

Report of Commissioner Wuest

Various dangers, which it is unnecessary at this time to enumerate, can be obviated to an extent by the formation of a National Employers' Council designed for the sole purpose of taking prompt and effective action. This council should consist of the president, vice-president and active executive officer of such associations as our own, the National Founders', the National Erectors', the National Furniture Manufacturers and many other similar national associations, whose officers and members would undoubtedly want representation.

EXPLAINS NATIONAL EMPLOYERS' COUNCIL IDEA

Such a council would not necessarily require more than a merely nominal working capital, for the reason that the expenses of its members and any extraordinary expense recommended by the council itself could be taken care of on some equitable basis by the associations represented. As one of our correspondents, in writing on this subject, put it, "What really ought to be done is to get some sort of action on the part of the investor." If bankers and investors would take the proper stand as regards the open shop the contractors (in the building trades for instance) would be compelled to do so. This, in a measure, could be brought about by this proposed council making representation to the American Bankers' Association and like associations having to do with granting of credits.

If such council as I have briefly outlined, with the backing of all other associations of employers, could be formed, it would strongly tend to place industrial matters in this country upon a sound footing.

Conditions may not be such at this time as to make much progress toward open shop conditions in many trades, but it is unquestionably the hight of time to begin the constructive work. I therefore seriously recommend that this convention place itself on record as being favorable to the formation of a National Employers' Council such as has just been described.

SUGGESTS LIABILITY INSURANCE COMPANY

The wide discussion and the rapid progress of legislation bearing on employers' liability and workmen's compensation, together with inquiries based on the very effective activities of our association's safety inspector, lead me to recommend investigation into the feasibility and desirability of this association forming a mutual liability insurance company to provide members of the National Metal Trades Association with liability protection at minimum cost. It has been suggested that this may well be one of the proper constructive functions of our association.

I am not prepared to express any views as to the wisdom, necessity or expediency of such a policy, but it seems timely to here suggest that an investigation into the matter may now be properly begun and the information secured upon which to base future definite action.

LEGISLATION NEEDED TO REPRESS DYNAMITING OUTRAGES

In last year's report I called attention to the need for individual state legislation having for its objective the repression of dynamiting outrages. It was proposed that state legislatures be requested to enact laws prohibiting indiscriminate sales of high explosives under penalty. Within a week or so the arrest of the McNamara brothers came about. Later the Federal Grand Jury at Indianapolis returned indictments against about 54 individual officers and members of the Structural Iron Workers' and other unions under a law prohibiting carriage of high explosives on public passenger conveyances. Their trials are to come up next autumn. In view of these facts I now renew my suggestion for state legislation along the lines proposed in my original recommendation. There can be no doubt of its effectiveness in aiding the prevention of dynamiting outrages that have horrified the country, as well as in giving important assistance to the federal government in stamping out these terrible affairs.

MEMBERSHIP

On March 1, 1911, the beginning of our fiscal year, we had 725 members in good standing. In the course of the year 54 applications for membership were favorably acted upon and 45 resignations accepted. There were pending at the time of the recent meeting of our Administrative Council, which preceded this convention, but subsequent to the close of the fiscal year, nine resignations, all of which were accepted; also eight applications for membership, which were favorably acted upon, making a total membership of 733 in good standing. The total number of operatives reported on the basis of the December, 1911, assessment shows a gain of 8 per cent.

H. E. Herrod reported as to his activities since August, 1911, as assistant commissioner. He dwelt especially on his observations during visits to various branches of the association and on his participation in opposition to objectionable legislation. All of the reports were accepted and ordered placed on file.

Henry D. Sharpe, vice-chairman of the Committee on "Systematic Compensation for Industrial Accidents," reported briefly on the progress made in that direction.

Report on Industrial Education

Fred A. Geier, chairman of the committee on industrial education, made an interesting report on what has been done in developing this branch of education during the year. He referred to the new Continuation School of the Manufacturers' Association of Hartford County, Conn.; to the Continuation School of the Cleveland branch in connection with the Young Men's Christian Association; the enlargement of the Boardman School, New Haven, Conn., and the new building of the Ranken Trade School, St. Louis. The reports of the Chicago branch on the results of the co-operative work at Lewis Institute and of the Cincinnati branch regarding the co-operative course in engineering of the Continuation School and of the Co-operative High Schools give indication of the great work the Metal Trades Association is accomplishing.

Mr. Geier referred to plans made concerning industrial education in various states and said: "These accomplishments indicate that the problem has vitally interested all classes of American people. The laws that have been enacted in behalf of industrial education are being reviewed in the light of experience and are being amended and extended to meet the new educational demands; we have now a fair idea of the legislation necessary; types of schools both abroad and at home are being carefully studied and adapted to American conditions; methods of administration and supervision are being worked out; the courses of study are being developed; the question of the new type of teacher needed is receiving attention both from the school and the manufacturer."

In the brief discussion which followed Frederick Fosdick, Fitchburg Steam Engine Company, Fitchburg, Mass., spoke of the so-called "Fitchburg system" of industrial education and said that co-operative education, or the combination of the real workshop and school, was without question the best plan because it gave opportunity for practical development and the operation of good machines under actual conditions which cannot be obtained academically. The privilege of the floor was then accorded to C. A. Prosser, secretary of the National Society for the Promotion of Industrial Education, who described the objects of the society he represented and pointed out the danger of the United States falling behind other nations unless the importance of industrial education is at once fully realized and supported by the manufacturers of the country. He said his organization stood ready to co-operate with every worthy plan for industrial training. He emphasized the need of Federal grants to encourage practical training, else is left to Germany the chance to capture the world's markets. He mentioned Germany's hope that in ten years' time there will be no untrained men in the empire and that indeed manufacturers will be forbidden to employ trained men from foreign countries so long as there is a home supply.

National Aid for Industrial Training

Frederick A. Geier then offered the following resolution which was adopted at the afternoon session with the indorsement of the Resolutions Committee:

BE IT RESOLVED: That the National Metal Trades Association, in convention assembled, recognizing that the future prosperity of this country and the welfare of its people is dependent upon their efficiency in the home, the shop and the farm, believe strongly that federal aid of a

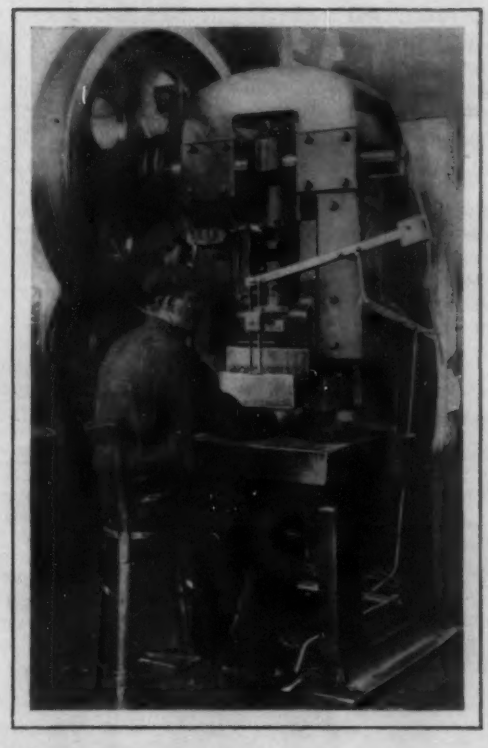
substantial character for industrial, household arts and agricultural training, fitting young people for all kinds of useful and wage-earning occupations should be granted by the national government at the earliest possible moment in order that the various states of the Union may be impressed with the interest of the national government in the movement for practical education, and stimulated by the aid and co-operation which federal support would give.

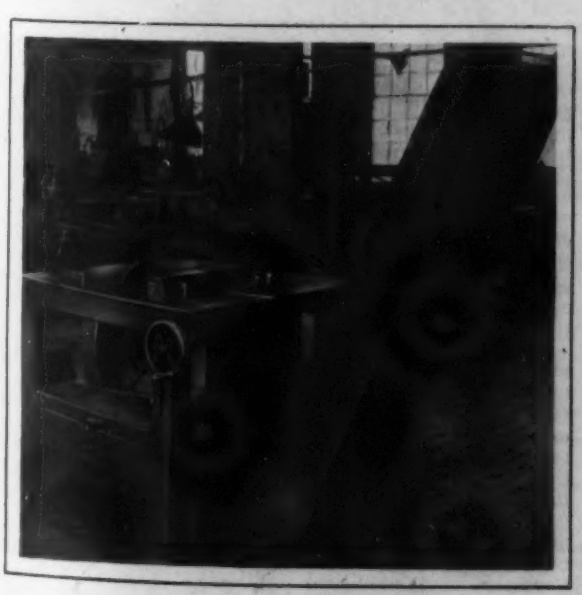
We believe that the conservation of the practical and constructive ability of the young people of this country is today at least as important a duty on the part of this country as the conservation of our forests and our mines, and that every consideration demands that steps should be taken to secure federal aid for promoting a system of education that will send our boys and girls out to the duties of life fitted to be effective, intelligent workers, as well as useful citizens.

For Human Conservation

Dr. Winthrop Talbot, editor of Human Engineering, in the remaining few minutes of the morning session, addressed the members in behalf of human conservation. He suggested that the association take up the subject in a broad way and instruct its inspectors of safety to investigate also the conditions which may be prejudicial to the health of the workers. Dr. Talbot also said:

"Statistics regarding sickness among industrial workers in Germany may be regarded as fairly accurate. In America we have few, if any, reliable statistics. The most reliable statistics in America have been collected by Dr. F. K. Hoffman, the statistician of the Prudential Life Insurance Company. He has attempted to make a close estimate of the economic results of industrial sickness and disease. He places the number of persons employed in industries as 33,500,000, and finds that the number of cases of sickness last year must have been not less than 13,400,000; the aggregate number of days of sickness 284,750,000; the loss of wages not less than $366,000,000,





Examples of safety provisions for machinery mentioned by William H. Doolittle, safety inspector of the National Metal Trades Association. The top picture shows a punch press guard installed in the works of the Cleveland Hardware Company. The upper right hand view of the group of the four remaining illustrations shows a belt guard in the Atlantic Works, Boston, provided so that a man walking without noticing the belt will not suffer injury. The lower left-hand picture of the group shows a belt guard of sheet metal and wire mesh in the plant of the Morgan Construction Company, Worcester. The upper left-hand picture is a jointer in the works of the Warren Steam Pump Company, Warren, Mass., provided with a flat guard kept by a spring over the portion not in use. The lower right-hand picture shows the Jones guard on a surface planer in the plant of the Kennedy Valve Mfg. Company, Elmira, N. Y.

resulting in a total economic loss among industrial workers of $772,000,000. It has been found that in Germany not less than 25 per cent is due to preventable causes. In America this would amount to an unnecessary loss of $193,000,000. Those impressive figures are conservative because it is generally agreed among medical men that the rate of sickness in America is somewhat higher even than that in Germany."

J. H. Schwacke, of Wm. Sellers & Co., Inc., Philadelphia, remarked that he could not consider the number of working hours ordinarily in force to-day as a detriment to the physical wellbeing of the worker. For example, the loss of time on the basis of 80,000 men-days 35 years ago was 7 per cent. and for 144,000 men-days in the last 5 years, in spite of the more intensive production now obtaining, it was about 5 per cent.

Safety Devices and Provisions

The afternoon session opened with a paper on "Prevention of Industrial Accidents," by William H. Doolittle, safety inspector of the association. He dwelt on the fact that the principal obstruction to safety work comes from persons it is designed to benefit, namely the workmen. Such of this opposition as arises from a lack of knowledge and appreciation of the benefits to be received has, he continued, to be met with diplomacy and instruction. It has been found very helpful to enlist the workman in the safety campaign, thus giving an outlet to the desire for self-expression found in many intelligent workmen and bringing out the inherent ingenuity and independent thought they like to exercise. "Not only are good guards produced in this way, but what is of greater importance, their maintenance and use are insured. There is also the case of the high grade workman to whom it must be made clear that the installation of safeguards is no reflection upon his skill."

Mr. Doolittle exhibited a large number of lantern slides covering safety devices for steam engines, wood working machinery, emery wheels, belts, projecting set screws, gears, punch presses, traveling cranes and ends of shafting and enumerated safety provisions in connection with railroad tracks, elevator wells and in foundries. A few pictures of safety arrangements collected by him are here reproduced. One illustration shows what has been provided in the plant of the Cleveland Hardware Company, where incidentally safety posters illustrating the safe and unsafe way of operating and placing machinery have been used with success. The poster with its halftone engravings also carries pads of little detachable report blanks. One of these blanks is intended for the employee to explain cases of defective machinery or conditions injurious to health, while the other is ruled so that he can report a case of injury.

Miles M. Dawson, a consulting actuary of New York, made an address on "Employers' Liability and Workmen's Compensation—What Has Been Done to Date and Is Now Doing in It." He gave a carefully detailed review of the status of employers' liability and workmen's compensation in the various states of this country and in the Canadian provinces, and explained various changes which have recently been made in the laws of European countries.

J. J. Feeley, Boston, Mass., read a paper on "How Far Must Business Yield to the Demands of Industrial Organizations." He made a careful analysis of the various elements of the relations of capital and labor during times of strikes and lockouts. Of special interest was his statement regarding restrictions as to strikes established by courts, especially by those of his own state. The paper is in part as follows:

Application of Common Law to Strikes

The courts of Massachusetts have been foremost in stating and applying the principles of the common law governing the use of such combined action, and though in many jurisdictions the decisions have been somewhat conflicting, the logical, legal principles applied by the courts of Massachusetts have in the main been pretty generally followed.

Whenever a strike case is in due course presented to the courts in Massachusetts for their consideration, after due notice to the parties involved or their representatives, the court having jurisdiction inquires first: What is the purpose of the strike? Is it for a lawful or unlawful purpose? If it be found to be for an unlawful purpose the court will issue its mandate restraining the parties involved, their agents and servants from carrying out such a purpose by any means whatsoever.

If, however, the object of the strike be found to be a lawful one, such for instance as an increase in wages or shorter hours, the court will simply inquire into the means used for furthering such strike, and if the court finds that illegal means are used, the court will enjoin the further use of such means by the combination. If such a strike is conducted by lawful means the court will not interfere.

Adopting this logical method the courts of Massachusetts have passed specifically upon a number of situations, and have in certain instances pronounced a strike to be for a justifiable cause and have labeled other strikes as unjustifiable.

UNJUSTIFIABLE COMBINATIONS

Some instances in which such combinations were found to be for an unjustifiable end, hence an unlawful purpose, are:

First. To secure a monopoly of a trade or calling;
Second. To create or maintain a closed shop;
Third. To engage in a sympathetic strike or boycott;
Fourth. To procure the discharge of a workman because he does not belong to an organization;
Fifth. To induce the violation of a contract on the part of a third person;
Sixth. To enforce upon the employer rules for arbitration made wholly by the union;
Seventh. To compel the discharge of a foreman for mere personal dislike on the part of the members of a union;
Eighth. To enforce the collection of a fine on an employee levied for the purpose of compelling him to engage in a strike.

The latter salutary rule of law laid down by our Supreme Court was recently reversed by the legislature of Massachusetts at the behest of members of organized labor, so that it is now possible in that state for a powerful union to force its members employed in a given factory to join in a strike instituted by such a union against their employer, however satisfied they or a majority of them may be.

WHERE RESTRAINT HAS FAILED

Perhaps the best contemporaneous effect of unrestrained control of industrial combinations is illustrated by conditions in England brought about by recent acts of Parliament. England has tried, in former times, various methods for controlling industrial combinations. She has tried governmental regulation of prices. She has tried enforced arbitration. She has tried suppression of combinations.

In 1907 Parliament went to the extreme length, courting the political favor of labor organizations, of passing a law depriving courts of the power to interfere in labor disputes. The result has been that in times of business prosperity such combinations have caused the cessation of industries until their demands were complied with. In periods of dull business employers have shut down their plants until their demands were complied with, and England, consequently, is today in the most deplorable condition, industrially, of any of the great civilized nations. As a nation, she has been threatened by combinations of railroad employees, with refusal to convey her troops if employed in opposition to the wishes of certain other allied combinations. She has seen her industries, her commerce paralyzed, her people made to suffer, her national security imperiled—not a happy result of absolving one class of her citizens from proper legal restraint.

CONDITIONS IN THE UNITED STATES

In our own country the effect which such combinations, seeking increased wages, have threatened to produce upon the public welfare, by the paralysis of those industries absolutely necessary for the existence of society, has aroused the public conscience to a most serious consideration of the subject.

In the contest with individual employers, not directly affecting the public welfare or imperiling its safety, the courts have permitted the employees to use the most effective weapon they possess, the strike, to the fullest extent where the purpose of the combination has been to secure increased wages or shorter hours, or better conditions, leaving it to the public to act through their legislatures when such demands become excessive or oppressive.

There is one class of strikes in which the public has a more direct and immediate interest than in any other, namely, strikes upon public utilities, such as railroads, steamship lines, municipal utilities, etc. The right of the body politic to insure its own safety is the highest conceivable right. There is absolutely no reason why the concerted action, action of large bodies of employees, deriving their income from the patronage and contributions of the people, where such action threatens the welfare or

safety of the public should not be subordinated to the paramount right of the body politic to assure its own safety. This principle has been recognized by the federal courts in the cases where, through bankruptcy or for other reason, such utilities have come under their jurisdiction.

Where a railroad was in the hands of a receiver appointed by the federal court and a combination of employees threatened to tie the road up by a strike, the United States court intervened, and by its mandate prohibited such combination from carrying its intention into effect. In cases of such an industrial dispute the paramount right of the public to insure its own welfare or safety is a sufficient justification for legislative action toward regulation or control. In the absence of legislative enactment to that end, the courts undoubtedly have the power to intervene and by their decrees regulate the conduct of any combination whose action is likely to endanger the public safety or welfare.

So, too, when any private industry has been so developed that its uninterrupted continuance is peculiarly necessary to the public welfare, as, for instance, a milk supply or a coal supply, and such industry becomes tied up by combinations of employees seeking increased compensation, to such an extent and for such a length of time as to cause widespread suffering and want on the part of the public, it seems that, failing action on the part of legislatures, the courts would have a clear right to intervene and to investigate the situation, and to control such combination so far as necessary to relieve the public from threatened danger.

COMPULSORY ARBITRATION OR STATE CONTROL OF WAGES

All this brings us to the question whether these combinations, which the public encouraged in their infancy in a laudable desire to improve the laborer's condition, will not soon be controlled by legislative action in the form of compulsory arbitration or state regulation of wages. Arbitration is usually satisfactory to combinations only so far as it means concession; and unwarranted concession spells only business oppression. Already the adoption of the latter course has been indicated in Massachusetts by the introduction of a minimum wage bill for women and minors, favorably reported by a legislative committee.

The principle of state regulation of prices for wages, as well as for necessaries, is an old and abandoned one. It has been tried in England and in the American colonies at various times before the adoption of our Constitution. It has been abandoned for reasons which are not necessary here to relate. Most of our states when they framed their constitutions, adopted in one form of language or another the principle of equal opportunity for all, special privileges for none, guaranteeing to every individual the right to acquire and possess property by all lawful means and to enjoy the blessing of liberty in tranquillity. Under these great principles we have developed the greatest republic on earth, opening its doors freely to the oppressed of every land, sharing with them its prosperity.

In no country does the laborer receive so high wages, in no land is it possible for him with thrift to net so much as is evidenced by the marvelous increase in the deposits of savings banks in industrial centers, the surest barometer of the prosperity of the laboring classes. Yet a clamor is heard, loudest from those who but a few brief years ago left their native land to improve their lot and upon whom, after a few brief years of residence, we confer the privilege of citizenship, the most valuable privilege we have to confer even upon our own children. They bring with them and force upon our attention ideas foreign to those which have hitherto inspired and guided the Anglo-Saxon race. Their numerical superiority in certain industrial centers enables them under our political system to cause such ideas to be favored by legislators guided by expediency and a desire for political advancement, rather than by wisdom and patriotism.

Comment was made upon the few resolutions which were offered. All which were brought before the convention were adopted. In addition to those already mentioned were these:

On Industrial Education

WHEREAS: The annual convention of 1911 unanimously adopted the following resolution, pertaining to the financial support of the campaign for the furtherance of industrial education, to wit:

"RESOLVED: That this convention of the National Metal Trades Association pledges itself anew to the furtherance of industrial education and the apprenticeship system and gives to the Administrative Council full power to expend $5,000 and take such steps as in their judgment will forward this movement"; and

WHEREAS: Under the authority of said resolution the Administrative Council has appropriated the sum of $1,000 only for such purposes;

THEREFORE BE IT RESOLVED: That the Administrative Council be and is hereby authorized to expend during the ensuing year for said purposes, in whole or in part, at its discretion, the sum of $4,000 remaining from the original 1911 authorization of $5,000.

The Review and Publicity

WHEREAS: We have learned that our publicity work is bearing good fruit in educating the independent workman to see the fact that employers and employees are not natural enemies, but have interests which are mutual; and

WHEREAS: A part, at least, of this is due to The Review, which is published in conjunction with our sister organization, the National Founders' Association; now, therefore,

BE IT RESOLVED: That the members of our association hereby pledge themselves to regularly place The Review in the hands of as many of their workmen as possible.

Election and Final Business

Following the adoption of the resolutions came the report of the nominating committee and the election and installation of officers. Mr. Caldwell surrendered his office in a few fitting words and Mr. Sharpe on taking the chair acknowledged the honor and the big task that had been laid out for him and his brother officers. When he finished he was presented with a floral piece by E. H. Beaman, of the Beaman & Smith Company, Providence, R. I. Short speeches were made by W. A. Layman, the new vice-president, and L. H. Kittredge, second vice-president. A cablegram was ordered sent to H. P. Eells, notifying him of his re-election as treasurer and conveying the good wishes of the convention.

J. H. Schwacke just before adjournment called attention to the 8-hr. bill now in the United States Senate and James A. Emory, general counsel of the National Council of Industrial Defense, spoke of the perniciousness of the bill, declaring that even lawyers were puzzled by its terms, and asked the members to write their Senators and urge that the bill be at least adequately amended.

Secretary MacVeagh on the Tariff

The banquet was notable in many ways. The speech of Secretary MacVeagh on the tariff was an important statement. He asserted that ultimately the world will have free trade. He said in part: "I am a tariff revisionist. I am a tariff reformer and I want to see lower tariff as much as any one does. But I would wait, if that were necessary—far rather wait—for further actual reductions or further adjustments than to lose, or seriously risk losing, a permanently established commission method of inquiry into tariff facts, and the real Simon pure schedule by schedule method of legislation."

Mr. Shuster spoke on the coming of universal peace, and he predicted that such a peace could only come when the tie of commercial relationship was strong enough to forbid war. Dr. Hammerschlag described the work and methods of the Carnegie Institute, of which he is director, and spoke of industrial training generally.

Oil Fuel

With a view to bringing before present and prospective users the advantages of oil as fuel, the Texas Company, 17 Battery Place, New York City, has brought out an attractively illustrated book of 149 pages with the above title. After a brief statement of a few of the advantages resulting from the use of oil as fuel, the specifications of commercial oil fuel are given, followed by a discussion of the general equipment required for oil burning. The various steps in the use of this fuel are discussed with reference especially to metallurgical operations and its use in conjunction with coal to meet peak loads and during the period when fires are banked. There are a number of illustrations of plants and vessels employing the company's oil fuel and the results of a number of tests made are given. Considerable data and a number of tables of useful information are also included.

The Charles A. Schieren Company has received the gold medal and diploma which was awarded to it for its exhibit at the Brussels exposition in 1910.

A New Thin-Lined Blast Furnace

A Type of Construction Adapted to Existing Stacks—Shell Cooling by Means of Water Sprays

The Detroit Iron & Steel Company, Detroit, Mich, some time ago put in operation a thin-lined blast furnace, which embodies in its construction several unique features. The A furnace stack of the company was built in 1902 and 1903 and was operated continuously, with the exception of short periods, until early in 1911. In 1909 the company began the construction of its second, or B, furnace, which was completed and blown in in 1910. Early in 1911 it was decided to reconstruct the A furnace, increasing the hearth, bosh and stock line diameters. After careful investigation of various types of thin-lined furnace installations, it was decided to construct the new furnace with shell dimensions suitable for this kind of lining and provide an inwall lining 12 in. in thickness. The hearth jacket is made from sectional cast-iron plates, with cooling pipes embedded in the castings. The adjacent sections are held together by steel links shrunk on, circular steel bands being used to reinforce and bind the entire jacket structure in a substantial manner. The bosh brick work is supported by seven steel bands in various widths and uniformly 1 in. thick.

An Outer and an Inner Shell

The equivalent of two furnace shells is provided in the new construction—the outer shell, which acts as a wind shield and supporting structure, and the inner shell, which is for the support and reinforcement of the brick lining in the same manner as is usual in thick-lined furnaces. The outer furnace shell is 56 ft. 4 in. high above the mantle ring, 25 ft. 3 in. in diameter at the mantle, and 20 ft. 6 in. in diameter at the top platform line. This shell is made of nine rings of steel plate, top and bottom rings being $\frac{5}{8}$ in., and the seven intermediate rings $\frac{1}{2}$ in. and $\frac{3}{8}$ in. in thickness. The mantle ring for the outer shell is of very heavy construction, the main plate being $1\frac{1}{2}$ in. in thickness, reinforced with structural shapes to make a total thickness of 3 in.

Fig. 1—View of Skip Bridge, Hopper, Bleeders and Downcomer

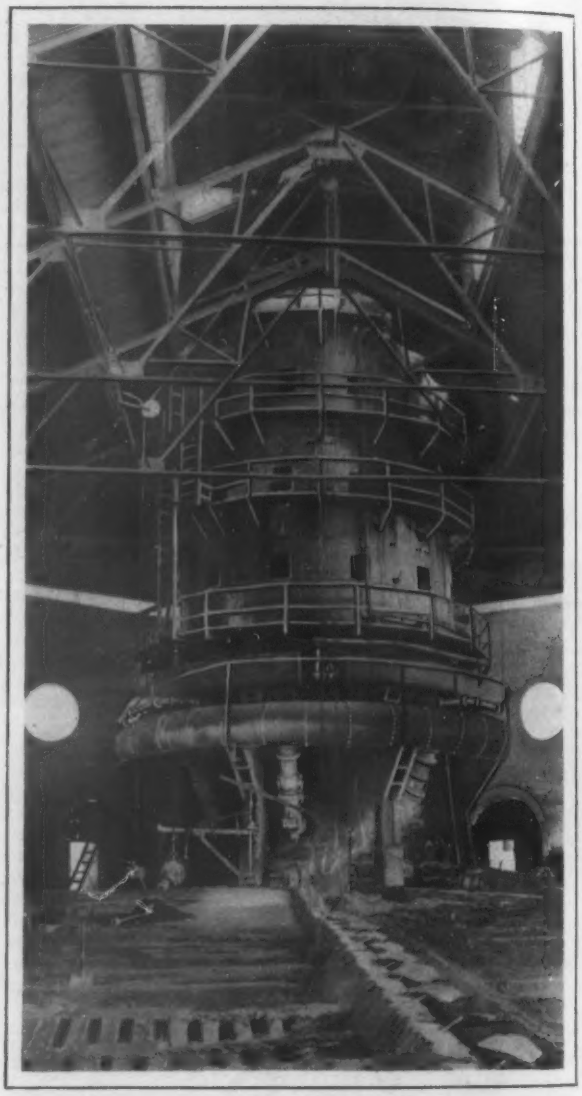


Fig. 2—View of Thin Lined Blast Furnace from Floor of Cast House

Both the inner and outer shells are supported on a single set of eight columns. These are made from two 18-in. and two 12-in I beams riveted together and are mounted on individual cast iron base plates resting on the furnace foundation. The columns are of sufficient hight to reach and support the outer shell and its mantle ring directly, the inner shell and its mantle ring being carried on structural brackets riveted to the inner side of each column. The columns are connected by struts at the top and bottom, the struts being made of two 12-in. channels with lacing bars between. The columns are set battered, thus giving a greater clearance around the furnace at the cast house floor level. The inner shell, which is supported on the structural brackets mentioned, is made of seven rings of $\frac{3}{4}$-in. steel plate. All vertical seams have triple-riveted joints with butt straps inside and out. The hori-

zontal seams are double riveted. Owing to the thin lining and consequent small load to be supported, the mantle ring is very light, being made of 1-in. steel plate 15 in. in width and reinforced by two 6 x 6 x 1-in. angles inside and outside the shell. The hight of the new shell is 63 ft. 4 in., and the over-all hight of the completed structure is 78 ft. as measured from hearth level to the top platform line.

Top Construction

A single downcomer having three branches connecting to the furnace at points spaced 120 deg. apart was provided. The downcomer branches connect directly to the outer shell, and this shell supports their weight. A single plate ring, running between the inner and outer shells at the connection points of the downcomer branches, completes the connection to the furnace.

Two bleeders 3 ft. 3 in. in diameter and 52 ft. in hight are provided. These are attached directly to the inner shell, clear opening being provided through the outer shell for the passage of the bleeder. The weight of the bleeders is carried almost entirely by the outer shell, structural brackets attaching to the outer shell and the bleeders being provided for this purpose.

The skip bridge is of the through type, and is provided with two tracks for the operation of skip cars. The bridge also supports the large and small bells by means of sheaves attached at its upper end. The skip cars and bells are operated by means of electric hoists of the Otis Elevator Company's design.

The platform at the top of the furnace is 38 ft. in diameter and is of very substantial construction. A structural jib crane is located on this platform for handling the various portions of the top equipment. The furnace is equipped with a McKee revolving stock distributer.

The inner furnace shell is provided with 12 steel brackets attached on the inside of the top ring for supporting the furnace top platform. The ends of these brackets have been removed for a sufficient distance to clear the top ring of the inner shell, and have been provided with guide angles at their inner end. These angles do not attach to the inner shell, a clearance of approximately ¼ in. being maintained between the angle and this shell. Their purpose is to insure constant vertical alignment between the inner and outer shells, which is necessary owing to the fact that the bells are supported by the outer shell, and the hoppers and distributer by the inner. Short cast steel brackets are also provided in the inner shell for support of the furnace top ring, hopper, gas seal and distributer.

Attention is called to the fact that although numerous connections for downcomers, bleeders, etc., are made to both inner and outer shells, the shells are not restrained from independent, vertical movement, such as may be due to expansion. The angles described, while maintaining the vertical alignment of the two shell structures, do not transmit to the inner shell and consequently to the brick lining any of the vibrations due to the operation of the skip bridge.

Cooling System

The system of cooling as applied to the inner shell is noteworthy for efficiency and flexibility in operation. Cooling is effected by means of six circular spray pipes, the circles being made of 2-in. extra heavy pipe, and having ⅛ in. diameter spray orifices spaced on 6 in. centers. The spray pipes are connected to four vertical supply pipes, each circle being connected at two points diametrically opposite. Valves are provided at the point of connection of the circle pipes to the supply pipes to enable independent regulation and control of the flow of water at various points on the shell. Two washout connections are also provided in each circle spray pipe. The water supply connections to the vertical pipes are so arranged as to obtain the most uniform pressure attainable at the spray orifices. A steel plate water trough attaching directly to the inner furnace shell at the bottom ring collects the cooling water, from which point it is discharged to the sewer. Six circular galleries are provided at various elevations on the outside of the outer shell. These consist of structural brackets bolted in place and supporting walks of wood construction. Ladders are provided for access to the galleries. Twelve rectangular openings each 20 x 24 in. in size are cut in the outer shell opposite each gallery to permit of inspection and repairs to the spray piping. Eight rows of bronze cooling plates are provided for protection of the bosh brick work, two rows of which are above the mantle plate of the inner shell, openings being provided through the bottom ring of this shell and below the water trough, to permit of withdrawal of such plates.

The brick work lining of the bosh is of the usual construction, of 9-in. and 13½-in. brick, and is approximately 2 ft. thick. The entire inwall lining is 12 in. in thickness,

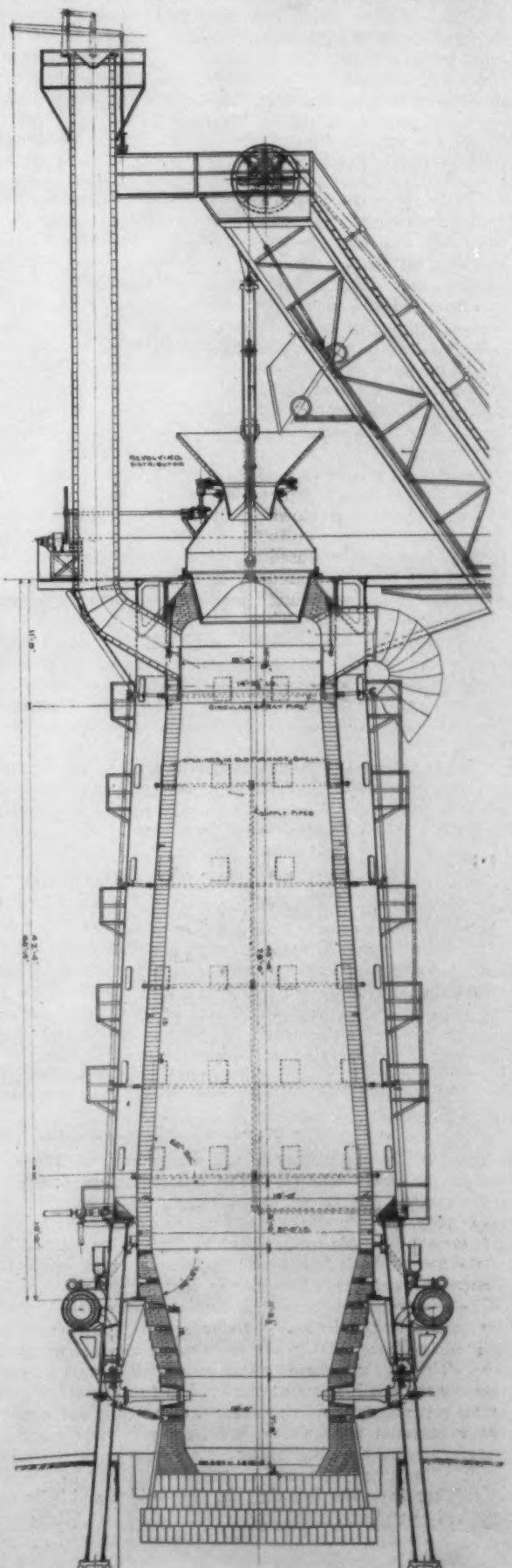


Fig. 3—Vertical Section of the McMurray Thin-Lined Blast Furnace

being made from special 6 x 12-in. key brick. As a means for additional support of the inwall lining three angle iron rings are provided and attached on the inside of the inner shell at various elevations. The hearth bosh and stock line diameters are 13 ft., 19 ft. and 12 ft. 6 in. respectively, as compared with 12 ft., 18 ft. and 11 ft. 6 in. on the original construction of the A furnace stack. The hight from platform level to hearth level was made the same in both the original and reconstructed furnaces, viz., 78 ft. A cast steel wearing ring, 4 ft. in depth, 2 in. in thickness and made in four sections, is provided to protect the brick work at the stock line from abrasion. The ring is supported by bolts from the top platform.

The Old Structure Retained

In the reconstruction of this furnace the only new materials entering into such construction are the new inner furnace shell and the parts attaching to it, the eight structural brackets supporting the inner shell, the system of spray cooling pipes, the galleries on the outside of the outer shell and the new brick lining. All other portions of the structure and equipment as described were portions of the original equipment of the old furnace, which, being in very fair condition were used without any modification. The furnace as reconstructed is, to all practical purposes, a new furnace. The ease with which rebuilding is accomplished, the comparatively small amount of time required, the low investment, and its applicability to almost any existing furnace plant make this a very interesting installation.

The furnace has now been in operation since December 19, 1911, having been blown in on foundry iron, and operations have been fully up to the original expectations. The tonnage has been increased approximately 24 per cent., the burden has been increased from 1.70 to over 2, and the coke, which is by-product, has been proportionately reduced per ton of iron. These comparisons are made with seven previous years of operation of this furnace on thick lining. As partial explanation of the increase in tonnage attention is again called to the fact that by the thin lining construction the hearth, bosh and stock-line diameters were increased 1 ft. each over the diameters with a thick lining.

This is believed to be the first installation made in this country of a thin-lined furnace reconstructed from an existing thick-lined furnace, and is the second installation in which shell cooling is effected by means of water sprays.

Advantages of the Construction Adopted

As a result of the construction of this furnace and its operation to the present time it has been found:

1. That the cost of reconstruction is comparatively quite low, the necessary expenditure for new furnace shell and thin lining, including galleries, necessary modifications to the existing shell, spray piping, etc., is from 50 to 100 per cent. in excess of the usual cost of relining a thick-lined furnace of similar size, including the cost of cast iron inwall cooling plates as usually found in such furnaces.

2. The cost of relining from the mantle up, including the removal of old brick work is approximately 40 to 50 per cent. of the cost of similar relining for a thick-lined furnace of the same capacity and dimensions, the time required for such relining being approximately one-third that required for the thicker lining.

3. That, given a thick-lined furnace of sufficient height, it is usually possible to increase the diametrical dimensions of the hearth, bosh and stock-line from 1 to 2 ft. in the reconstructed furnace, when such increase seems desirable.

4. That the method of shell cooling is theoretically correct, the volume of cooling water being automatically increased in direct ratio to the increase of internal temperature. That the volume of water as applied to various portions of the shell is at all times subject to independent, external control, and from the fact that water is not applied under external pressure or head, there is no danger of water entering the shell and causing damage to the brick work.

5. That from the fact that the skip bridge and bells are attached to and supported by the outer shell, vibrations due to their operation are not directly transmitted to the inner shell, and the possibility of damage to the brick lining in the upper portion of the furnace due to this cause is entirely eliminated.

The type of construction embodied in this installation is covered by patents allowed to Max McMurray, manager of furnaces for M. A. Hanna & Co. Arthur G. McKee, Cleveland, Ohio, was engineer for the installation and controls the licensing of Mr. McMurray's patent. The Variety Iron & Steel Works Company furnished and erected all steel work. The operation of the furnace is in charge of P. J. Moran, superintendent of the Detroit Iron & Steel Company.

Iron-Ore Reserves of Michigan

"Iron-Ore Reserves of Michigan" is the subject of an advance chapter by Dr. C. K. Leith, from Mineral Resources for 1911, United States Geological Survey. The report shows an estimated reserve in the mines of 124,598,164 gross tons of high-grade ore—that is, what is known under present mining conditions as commercial ore—and of 44,982,938 tons in drilled areas, or a total reserve of 169,581,102 tons. The estimate leaves out of consideration high-silica, low-phosphorus ores of even about 40 per cent. grade which have been mined on both the Gogebic and the Marquette ranges.

A broad survey of the field, which covers the Gogebic, Iron River, Crystal Falls, Menominee and Marquette districts, was made by Dr. Leith in the summer of 1911. The probabilities of extension in every district but the Menominee are so strong that it is safe to estimate that for many years the ratio of reserve to total shipment will be maintained; in other words, that as much ore will be discovered yearly as is mined yearly. In fact, to-day the reserve probably bears a larger ratio to the total shipment than at any time in the past, and the possibilities of developing more ore are so great that 10 years hence there will probably be greater reserve in proportion to shipment than now. The growing tendency of the larger interests to make sure their ore supply for years in advance is leading to the development of increasingly large reserves in proportion to past shipment. Enough facts might be cited in relation to individual mines, explorations and ranges to show that this forecast of the future is not based on vague surmises. Large extensions, both vertical and areal, are inevitable. Probably not more than 10 per cent. of the area of the upper Huronian slates of the Crystal Falls, Menominee, Iron River and adjacent areas has been explored.

The total known area of iron formation is stated to be 29,267 acres, but in addition there are fully 20,000 acres of magnetic belt in which exploration has scarcely more than begun.

The general conclusion of Dr. Leith's report is that at no time has the outlook for long life for Michigan ores been any better assured than it is now. In few other regions will expenditures for large explorations yield more certain results. The future size of the reserve will bear a more or less direct ratio to the money expended in exploration. There is yet no indication of diminishing returns from exploration. In fact, increased knowledge of the geologic conditions is bringing more certain results for a given expenditure of money. The reserve will cease to grow only when difficulties of exploration or outside economic influences begin to limit the amount of exploration.

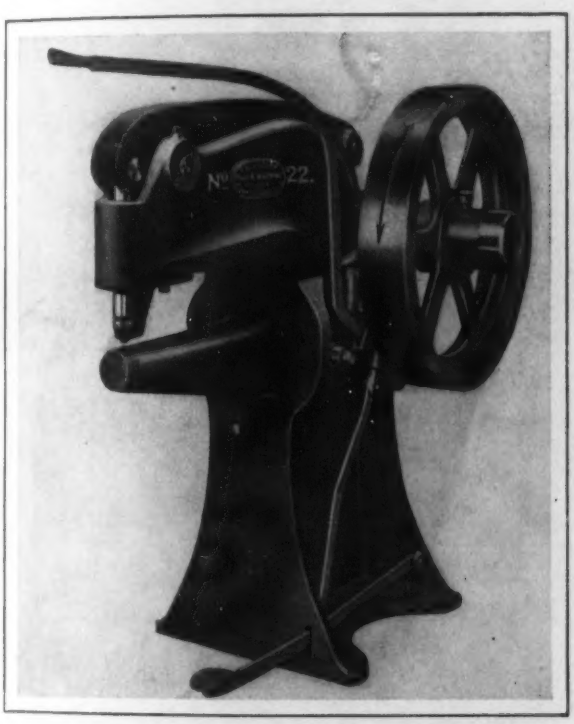
The Meaker Company, Chicago, manufacturer of galvanizing machines and equipment, has removed from its old location, 218-224 North Elizabeth street, to its new building at the corner of Fulton and Elizabeth streets. In addition to being a manufacturer of galvanizing equipment, the company operates a large job electrogalvanizing plant.

The American Car & Foundry Company has finally absorbed the Helmbacher Forge & Rolling Mills plant on the west side of the river at St. Louis, which it has controlled for some time. The Granite City plant of the Helmbacher Company is idle at present.

The Pennsylvania Steel Company and the Maryland Steel Company have opened offices at 420-422 Rockefeller Building, Cleveland, Ohio. Stanley H. Smith, formerly at the Steelton plant of the Pennsylvania Company, is in charge.

Combined Punch and Riveter

A recent addition to the line of sheet metal tools built by the Excelsior Tool & Machine Company, East St. Louis, Ill., is a combination punch press and riveting machine. This machine, which is designated as the Excelsior No. 22, was designed to meet the requirements of shops where special work that cannot be handled successfully by punch presses is often produced. One of the special features of the press is the use of a removable die holder. As will be noticed by referring to the accompanying engraving, the housing is well proportioned to withstand the strain it encounters in operation. The crank is of steel and is well supported in long bearings. The lower arbor or die holder is removable, and any desired shape of arbor can be inserted readily to accommodate special requirements. The clutch controlling the operation of the press is of the three-jaw type, and together with the jaws on the flywheel, it is lined with tool steel. The punch is controlled by either the foot treadle or the hand lever, and can be stopped automatically at any hight above the die, which is necessary when punching to center marks. This distance can be varied



The No. 22 Punch Press and Riveting Machine Built by the Excelsior Tool & Machine Company, East St. Louis, Ill.

by changing the location of the wedge on the clutch. The positive locking device should be in place before changing the punches, riveting head or dies. When this operation is being performed the dies are first removed, then the punch can be changed by turning the shaft so that the punch head is at its highest point. It is emphasized that the stripper does not obstruct the operator's view of the punch or die, and any special type can be fastened to the housing by four cap screws.

The following table gives the principal dimensions and specifications of the machine:

Stroke of punch, in.	1
Maximum diameter of hole punched, in.	3/4
Maximum thickness of material handled, in.	5/16
Maximum diameter of rivets, in.	5/16
Depth of throat in.	20
Distance from dies to floor, in.	36
Diameter of fly wheel, in.	32
Face width of fly wheel, in.	5
Weight of fly wheel, lb.	450
Speed of fly wheel, r.p.m.	80
Total weight, lb.	2,400

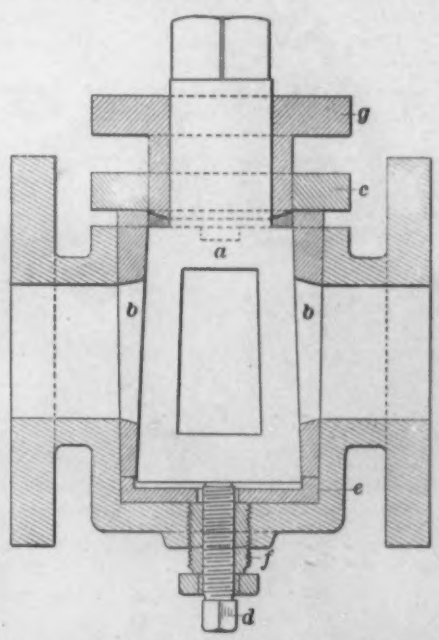
The equipment regularly furnished with the machine includes two sets of punches and dies, while extra punches or dies and riveting blocks can be procured at a slight additional cost if desired.

The Kelley Boiler Company, Wellsville, Ohio, has changed its name to the Consolidated Heating Company.

The Turneasy Blow-Off Cock

Several interesting features are embodied in the construction in the new Turneasy renewable plug and bushing blow-off cock manufactured by the Easton Tool & Machine Company, Easton, Pa. The fitting is made in stock sizes ranging from 1 to 3 in. and for pressures up to 200 lb. It is equally adapted for use in connection with steam, water, gas or compressed air pipe lines. All the wearing action takes place on the valve and bushing, and these are made interchangeable for every size of valve in brass, bronze, iron, steel or any special alloy that may be ordered.

The body is generally made of cast iron or steel and the ends are either flanged or threaded. The pocket in which the bushing rests is bored with a slight taper to



View Showing Constructional Details of the Turneasy Blow-Off Cock, Made by the Easton Tool & Machine Company, Easton, Pa.

afford an easy means of access for the insertion or removal of the bushing and the plug. The taper of the plug *a* is the reverse of that of the bushing *b*, and these two parts are held in position in the body by the retaining gland *c*. Reversing the taper of the plug and the bushing serves as a means for keeping the former part tight and enables the wear to be taken up through the set screw *d*, which is also used for the adjustment of the plug. In removing the bushing and the plug, the disk *e* is forced upward by the screw *f* and serves as a means of starting the bushing from its seat. The space between the retaining gland *c* and the plug stem is filled with packing, which is held in place by the neck of the packing gland *g*, these glands being bolted directly to the body of the cock. The set screw *d* keeps the plug at the degree of tightness desired by the operator.

A Diesel Engine Combine.—The London Financial Times says: It is reported that an amalgamation is contemplated between the Diesel Engine Company, Carels Bros., a Belgian undertaking that manufactures Diesel engines, and Davey Paxton & Co., of Colchester. The capital of the combined undertaking is placed at £750,000 ($3,750,000). Considerable developments are reported in connection with the Diesel engine, and this amalgamation is probably for the purpose of assisting these. The policy of giving other firms a license to manufacture Diesel engines, however, has proved successful and is not to be discontinued.

The first launching at the new yard of the Great Lakes Engineering Works at Ashtabula, Ohio, took place April 6, when the freighter Louis R. Davidson slid down the ways. The vessel is being built for Boland & Cornelius, Buffalo, and is 524 ft. long with 56 ft. beam.

The New Iron Ore Dock at Port Bolivar

A Description of Loading Facilities on Galveston Bay for the Ores of East Texas —Railroad Lines to Mines and Furnaces

BY WILLIAM B. PHILLIPS*

As a supplement to the articles on the iron ore situation in east Texas, which appeared in *The Iron Age* of January 4 and 11, a word should be said with respect to shipping facilities, provided that these ores are to seek a coastwise or foreign market in any considerable quantities. At Port Bolivar, on Galveston Bay, opposite the city of Galveston, the Gulf, Colorado & Santa Fe Railway has constructed an ore-shipping dock, shown in the accompanying views taken by the writer. The length of the dock is 324 ft., of wooden frame construction. The hight is 58 ft. above tide, i.e., 46 ft. above the platform, which is 12 ft. above low tide. There are double tracks 1800 ft. long for holding the loaded cars, which are pulled up a 10 per cent. grade by means of a gasoline-driven hoist. At present the storage bins are small, so that there must be a fairly steady movement of cars up and down the incline, which is 550 ft. long. There are four loading chutes, spaced to conform to the hatchways of the steamers that are to be in service.

The maximum loading capacity from car to ship would appear to be about 400 tons an hour, but it is likely that 300 tons will more nearly approach actual service. At this rate a 10-hour day would be required to load 3000 tons. If 50-ton cars are to be on this service it will require 60 cars of ore a day to load one steamer; and as there are at present no adequate storage bins these cars will have to be handled up and down the incline. This means six cars an hour for a 10-hour day, or a car every 10 minutes. This is the first ore-loading dock on the South Atlantic or Gulf coast.

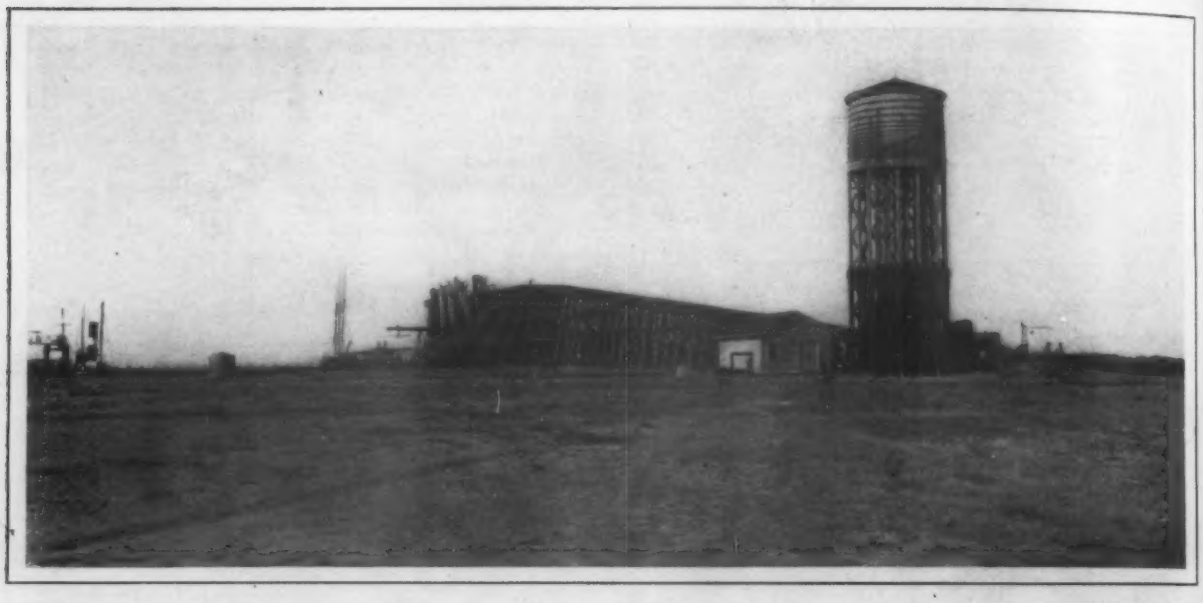


Fig. 1—Iron Ore Trestle at the Terminus of the Gulf, Colorado & Santa Fe Railway, Port Bolivar, Galveston Bay, Texas

2—Chutes for Loading East Texas Iron Ore at Port Bolivar Dock

A 250,000-Ton Contract for Philadelphia Delivery

It has been stated recently that a contract for 250,000 tons of east Texas ore, Philadelphia delivery, has been made and that this ore will go out by way of Port Bolivar.

*Director Bureau of Economic Geology and Technology, University of Texas, Austin.

From points along the Santa Fe Railway a rate of $1 a ton on iron ore to tidewater has been authorized, but no rate from Texas gulf ports to American or foreign ports has been made as yet. The maximum haul on the Santa Fe will be from Daingerfield, Morris County, to Port Bolivar, a distance of 318 miles. At present the branch from Longview, where the Santa Fe crosses the International & Great Northern Railway, to Daingerfield, where connection is made with the Missouri, Kansas & Texas Railway, is not fully completed, but it is built as far as Hughes Springs, Cass County, where excellent ores are found. A haul of, say 300 miles, at $1 a ton, is putting the cost at 1/3 cent per ton-mile, which is reasonable enough.

The Santa Fe now occupies a strategic position with respect to coastwise or foreign movements of east Texas ore. It is the only road which can offer a one-line haul from mines to tidewater, with ore-handling facilities. There are no ore docks at Port Arthur, Sabine Pass, Galveston, Texas City, Velasco, Port O'Connor, Aransas Pass or Corpus Christi. Whether such docks will be built at any of these places remains to be seen. So far as concerns Texas ports, the Texas Railroad Commission has the power to fix rates for freight originating in and confined to the State. It does not seem likely that a lower rate than $1 a ton will be made, so that the other roads entering the ore districts and having an outlet at some Texas port will have to meet this rate if they expect to secure a share of the business and in addition provide ore-shipping facilities.

Two other roads might be in position to do this—the International & Great Northern and the Texas & New Orleans. The first of these enters the counties of Gregg, Rusk, Smith, Cherokee and Anderson, where there are good ores. In connection with the other Gould road, the Texas & Pacific, it also has access to the ores in Harrison, Marion and Cass counties. Its natural outlet on the gulf would seem to be at Velasco, and it is of interest to note in this connection that a new steamship line proposes to have its terminals at this port. From the northeastern part of Cass County to Velasco, by way of Palestine and Houston, is 358 miles, or about 40 miles further than the Santa Fe haul from Daingerfield to Port Bolivar. There are as yet no ore-handling facilities at Velasco.

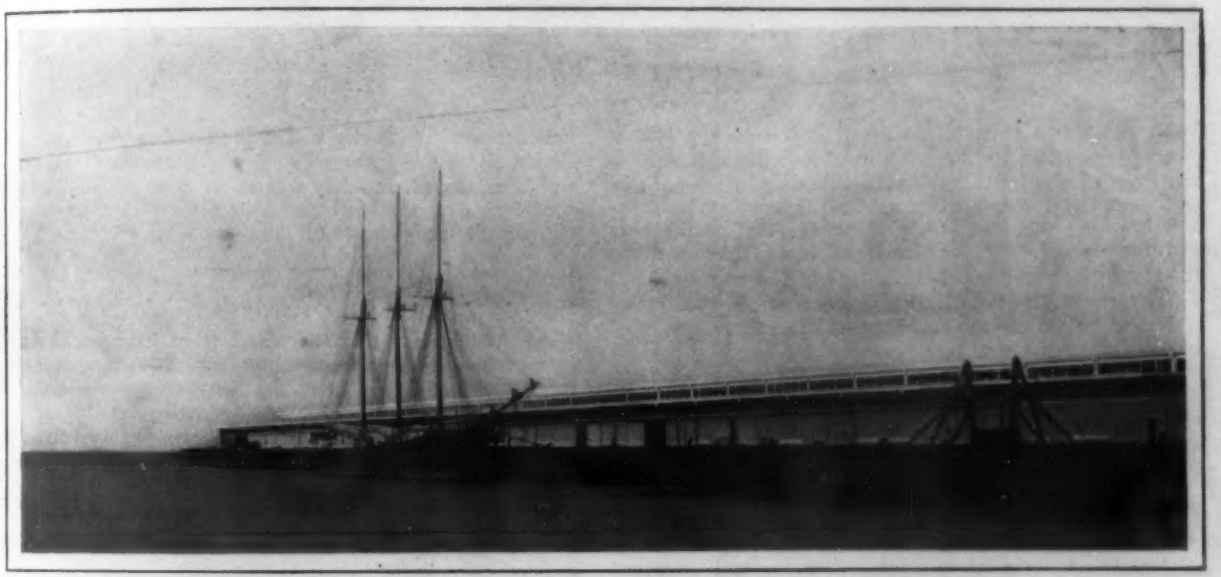


Fig. 3—One of the Piers of the Gulf, Colorado and Santa Fe Railway at Port Bolivar

Texas Ores and Texas Furnaces

The Texas & New Orleans Railway, "Sunset-Central lines" (Southern Pacific), traverses from Dallas to Port Arthur by way of Beaumont, the ore-bearing counties of Henderson, Anderson, Cherokee and Nacogdoches. From Athens, Henderson County, to Port Arthur is 225 miles, or 93 miles shorter than the Santa Fe haul from Daingerfield to Port Bolivar. Allowing that most of the ore shipments over the Santa Fe will be from points not quite as far north as Daingerfield, it would still appear that the Texas & New Orleans Railway has an advantage of 75 miles in the distance to tidewater. Furthermore, this road now touches one, and almost touches two others, of the four blast furnaces in the State. The ore it touches is the State furnace at Rusk (over the Gallatin branch) and there are two other furnaces within three miles of Rusk, the Star and Crescent and the Tassie Belle. The State furnace, with an annual capacity of 23,000 tons, has not been in blast since the early part of the year 1909. The other two furnaces, with a combined capacity of 31,500 tons a year, have not been in blast for a number of years. Inclusive of the furnace at Jefferson, Marion County, which has not been in blast for several years, the capacity of all of the furnaces in Texas is 72,500 tons a year. Of this amount the furnaces at and near Rusk, tributary to the Texas & New Orleans Railway, represent 54,500 tons, or 75 per cent. of the total.

A word more as to rates. A few years ago something over 2000 tons of iron ore was shipped from Cass County to the Birmingham district, Alabama. The distance is about 500 miles and the rate was $2.20 a ton. This movement of ore, however, has ceased. It might be revived if suitable arrangements could be made for shipping ore in return for coke. A fair blast furnace coke can be secured in the Birmingham district for $2.50 a ton and the present rate to Rusk is $3.10, making the total cost at Rusk $5.60. The coke cars would go back empty unless return loads of iron ore could be secured. The ore that was sent to Alabama averaged a trifle over 57 per cent. in iron, with phosphorus below 0.20 per cent. Such brown ore is not obtained in Alabama, the average being below 50 per cent. in iron, with phosphorus about 0.30 per cent.

The proximity of the east Texas iron ore fields to very large deposits of lignite would make it possible to calcine the ores at a low cost and to use and ship ore of extra quality.

The price of lignite at the mines varies from 85 cents to $1 a ton. A ton of ordinary lignite yields from 50,000 to 60,000 cu. ft. of producer gas, which carries 125 B.t.u. per cubic foot, and this gas is suitable not only for heating purposes but also for gas engines.

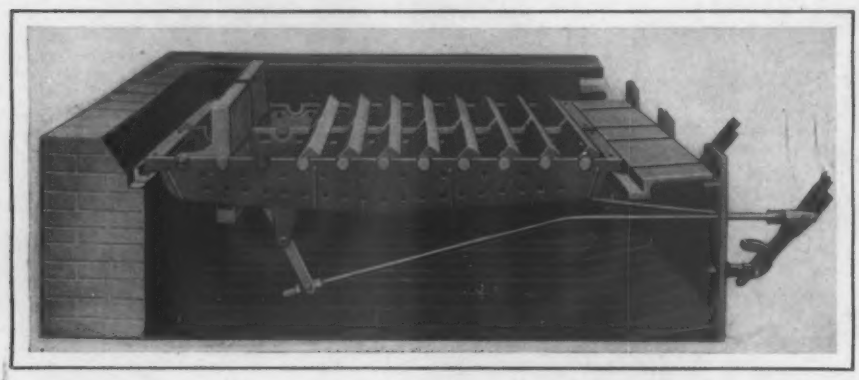
It would appear that the use of lignite producer gas in the beneficiation of east Texas brown ores, whether for local use or for coastwise and foreign shipment, has much to commend it to the consideration of ore shippers and furnacemen.

The releasing of a number of cars by the more favorable weather resulted in an increase in the latest idle car statement, for the period ended on March 27, the net car surplus on that date having been 18,708. Two weeks earlier the shortages reported in various parts of the country almost resulted in wiping out the net surplus, the total number of idle cars reported on that date, which was 3,043, having been the smallest in years.

The Pacific Commercial Company, successor to Castle Bros.-Wolf & Sons, 310 California street, San Francisco, Cal., has established an office in New York, at 25 Broad street, of which C. T. Briggs has been placed in charge.

New Rocking and Dumping Grate

The Kelly Foundry & Machine Company, Goshen, Ind., has recently brought out a new type of rocking and dumping grate possessing as an improved feature a large rear dump grate which is operated independently from the main grate surface. This arrangement, it is emphasized, enables the largest clinker formations to be disposed of easily and quickly at the rear of the furnace.



A New Type of Rocking and Dumping Grate Built by the Kelly Foundry & Machine Company, Goshen, Ind.

With this grate it is pointed out that it is very easily cleaned by reason of the hand lever which projects from the front of the furnace. The combination of the rocking and dumping features gives the advantages of agitating and breaking the fuel bed, shifting the fuel to the rear and the one already mentioned of being able to dump the accumulations of clinker and ash at the rear.

These grates are made in a number of different styles and sizes to fit various furnaces. They can be arranged in rows of one, two or more grates according to the width of the furnace. The air space in the furnace is adjusted to the kind of fuel being burned. The grate is self-contained and in installing it no alterations in an ordinary furnace are necessary.

The Production of Lead in 1911

The United States Geological Survey has just issued its annual statement of lead production for 1911, prepared by C. E. Siebenthal, directly from reports from all lead smelters in operation during the year. The preliminary estimate of the production in 1911 of lead published by the survey, January 2, 1912, is shown by comparison with the final figures to have been but one-ninth of 1 per cent., or 544 tons, in excess of the actual production.

The total production of refined lead in the United States from both domestic and foreign ores was 486,975 net tons as compared with 470,380 tons in 1910, a gain of 16,595 tons, or 3.5 per cent. The total production, including antimonial lead, was, for the first time, more than half a million tons, the exact figures being 501,053 tons. Of the refined lead produced, 295,357 tons was desilverized lead, and 155,947 tons was soft lead, in addition to which there was 35,671 tons of desilverized soft lead. The gain in soft-lead production over 1910 was 22,374 tons, which compared with the total gain for the year, 16,595 tons, shows that the output of desilverized lead fell off 5779 tons. The antimonial lead production for the year was 14,078 tons, practically the same as in 1910.

Missouri held first place, with an output of 182,207 tons, and also made the greatest increase for the year, the gain over 1910 being 20,548 tons. Idaho, ranking second in production, with 117,159 tons, made also the second greatest gain, 17,235 tons. Utah produced 55,198 tons, a falling off of about 2000 tons. Colorado, with an output of 30,621 tons, lost over 5000 tons as compared with 1910. The lead of Mexican origin suffered a big reduction, chiefly due to political conditions in that country. The total production of lead of foreign origin was 94,134 tons, as compared with 108,553 tons in 1910.

The plant of the Mann Indicator Mfg. Company, Sebring, Ohio, will be sold at public auction by United States marshal May 3 to satisfy a judgment. The plant was appraised at $16,410.

The Canadian Pacific's Ogden Shops

The great car shops which the Canadian Pacific Railway Company is erecting near Calgary are stated to rank among the biggest undertakings of that great corporation. They are named the Ogden shops in honor of I. G. Ogden, one of the vice-presidents of the company, and the town which will grow up around them is also to be called Ogden. The shops are to have the most approved equipment. They will consist of a group of 20 buildings, and occupy an area of 120 acres, the locomotive works alone covering from six to eight acres.

The Ogden shops are intended by the Canadian Pacific to provide for the repairs to equipment on its Western lines. That they will have plenty of work to do is evidenced from the fact that the company makes it a point to completely overhaul its rolling stock at least once a year, so that its equipment may always be in the highest possible state of efficiency. A few years ago the Angus shops at Montreal and the shops at Winnipeg were sufficient for this work, but the rolling stock has increased so greatly within the last few years that the Ogden shops are a necessity. Between 2000 and 3000 men will be employed, and they will be systematically housed on a modern plan that will make the town of Ogden one of the world's model hives of industry.

Iron Ore Analysis Books

M. A. Hanna & Co., Cleveland, Ohio, have issued their Lake Superior ore book containing cargo analyses for 1911. One new ore is listed, the Norman, a non-Bessemer, from the Palm mine in the Gogebic range.

An attractive leather-bound ore analysis book, published by Corrigan, McKinney & Co., Cleveland, contains the 1911 analyses of ore sold by this firm, with blank pages for notations of analyses of special ores. There are no changes in the ores shown in this firm's preceding list.

In a well-illustrated pamphlet of special typography the Republic Iron & Steel Company presents analyses of its Lake Superior iron ores for the season of 1912. The views are of the company's iron mines, blast furnaces, open-hearth steel works and tube works. The ores are products of the Mesaba range, with the exception of the Cambria of the Marquette range and Clifford and Antoine of the Menominee range. A list of the company's mining and manufacturing properties is given, as well as of its products, beginning with ore and coke and including both Northern and Southern pig irons. A great number and variety of finished forms are enumerated. The company's Risco ore is a mixture of its Pettitt, Schley and Bessemer No. 3 of the Mesaba range.

Milwaukee's Iron and Steel Manufactures

In the forthcoming Year Book of the Merchants' and Manufacturers' Association, Milwaukee, Wis., the following statement will appear:

The position of Milwaukee, with respect to the iron and steel industry, is especially fortunate. Not only do local or nearby furnaces and mills produce pig iron, bars, billets, sheets, etc., in large quantities, but these, as raw material, enter into the manufacture of high-grade machinery and related products to a greater extent and in greater variety than in any other city of the country.

In many lines, such as steel castings and forgings; agricultural and dairy machinery; equipment for machine, pattern and woodworking shops; automobiles, trucks and parts; motor-cycles; galvanized and corrugated sheets; malleable and seamless drawn steel products; hardware, stoves, furnaces and plumbers' supplies; heavy chains, conveyors, elevators, etc.; crushing and cement-making machinery; concrete mixers; contractors' equipment; stationary and traveling cranes; ore and coal handling machinery; bridge and structural parts; saw mill and flour

mill machinery; steam, gas and gasoline engines; gas producers; steam and hydraulic turbines and governors; condensers, ice-making and refrigerating machinery; air brakes, vacuum cleaners and other pneumatic apparatus; air compressors, blowers and blowing engines, brewers' and tanners' machinery; lubricators; steam and gasoline locomotives; dredges; steam shovels and wrecking cranes; lifting magnets; mining machinery; welding outfits; pumping machinery and accessories; electric generators, converters, transformers, motors, controllers, etc., the products of the local plants take high rank and many of them are largely in service the world over. With the growth of the iron and steel industries there has, of course, been corresponding development in other lines of metal working, including the use of brass, zinc, aluminum, lead and various alloys.

This all means that, for the most part, only the better classes of workmen can be used in Milwaukee plants, and the percentage of skilled, permanently located labor is unquestionably higher, according to the output, than in any other section of the country. The local industries also display a very happy combination, namely, the thoroughness of German and other European workmen with the ingenuity of American engineers, which has resulted in efficiency of the highest degree.

Despite the general business depression there has been during the past year a substantial increase in the number and facilities of Milwaukee metal-working plants, and local industries are on a firmer basis than ever in their history.

The Magnalamp

A Magnetized Portable Electric Lamp for Shop Use

An interesting lighting device which is known as the Magnalamp has been brought out by the Sachs Laboratories, 103 Allyn street, Hartford, Conn. The most interesting feature of the lamp and the one which gives it its name is that it may be attached magnetically to any mass of iron or steel, irrespective of the condition of its surface as regards smoothness or paint. The lamp may be hung from the underside of a horizontal surface or placed at right angles to a vertical one and it is pointed out that the magnetic pull is so powerful that it will hold the lamp in this position until released. A view of one of these lamps in use on a planer is given in Fig. 1, while if desired the lamp can be equipped with a counterbalance and used as a regular incandescent lamp, as shown in Fig. 2.

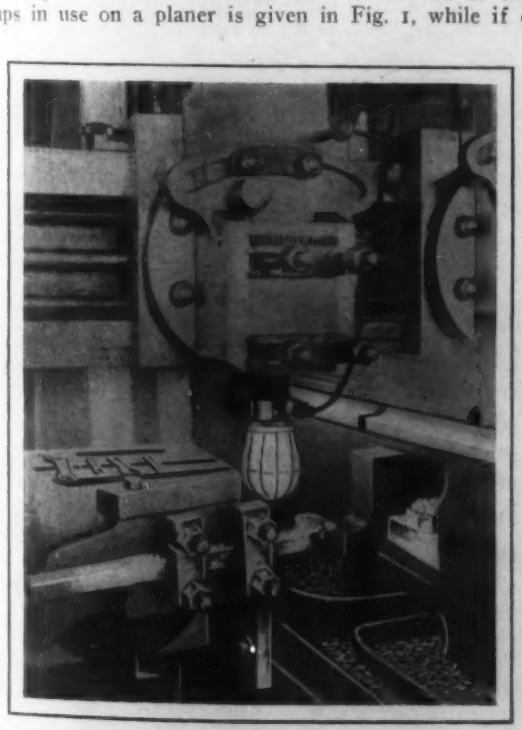


Fig. 1—A Planer Equipped with a New Type of Lamp Manufactured by the Sachs Laboratories, Hartford, Conn.

The incandescent bulb protected by an electrically welded wire guard extends either from the top or from the side of the base, the change in position being easily and quickly made. A detachable reflector which is fitted to the inside of the guard is also provided. The base contains two sockets, one on the end and the other on the side. The current which supplies the lamp and also the magnet is led to the receptacle through a well insulated

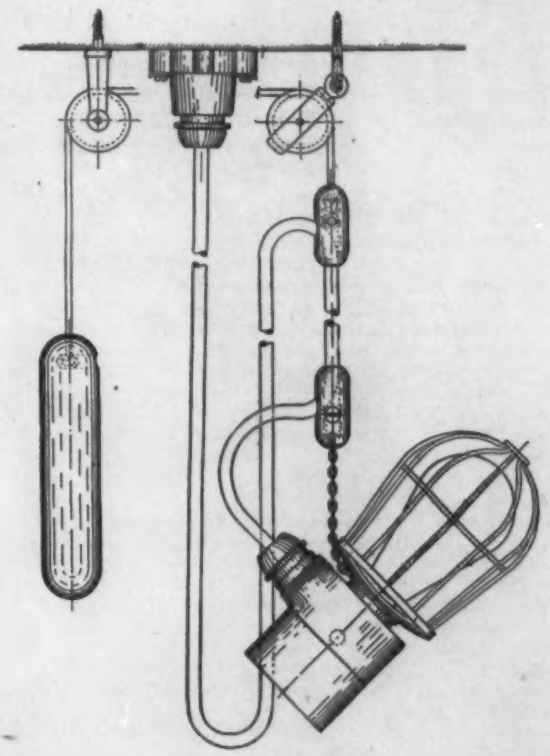


Fig. 2—The Lamp with a Counterbalance Used as a Regular Incandescent

and mechanically strong flexible cable terminating in a connecting plug. This plug can be screwed into either socket of the receptacle, the lamp being placed in the other. It is pointed out that the amount of current consumed by the magnet is very small.

A quick-acting switch operated by a knurled disk forming the central pole piece of the magnet controls the current. Gripping this pole piece with the thumb and forefinger on the knurled edge and moving it in a clockwise direction turns the switch completely on or off with each snap. When the magnet is in use this switch is inoperative. After the current has been turned on and the lamp lighted, grasping the lamp in the hand and pressing a push button on the side of the casing above the magnet de-energizes the magnet so that the lamp can be placed, removed or changed in position. When the lamp is placed in its new position and the button is released the magnet is again energized and holds the lamp firmly wherever it may be placed. The light circuit is unaffected by the making and breaking of the magnet circuit so that it is not necessary to manipulate the lamp without light.

Direct current is required for the operation of the device, which is furnished in two styles for use on circuits of 110 and 220 volts, respectively. The lamp is of the regular carbon filament 16-cp. type. If lamps of lower or higher candle-powers are substituted the force of the magnetic grip varies in the same proportion. The amount of current required by the 110-volt Magnalamp is approximately ½ ampere and when used on a 220-volt circuit the current consumption is one-half as great.

The fallacy that several coats of paint protect iron from rusting better than one is indicated by experiments reported recently in Zeitschrift für Elektrochemie. Iron with two coats of paint was partly rusted; iron with three coats, more so; iron with four coats was entirely covered by rust, while iron with one coat of paint appeared unaffected by rust. The author thinks that the application of several coats of paint increases the number of local electric elements formed at the surface of the iron, giving rise to stronger currents than in the case of a single coat of paint.

S. DIESCHER & SONS,
Mechanical and Civil Engineers
PITTSBURGH, PA.

Mining Men Before the Stanley Committee

The Steel Corporation Investigators Turn Their Attention to the Subject of Iron Ore Deposits in Both the North and the South

The Stanley Committee is still investigating the United States Steel Corporation, notwithstanding announcements that it had decided to discontinue the examination of witnesses. On April 11, 12 and 13 it had before it Don H. Bacon, Joseph Sellwood and Thomas F. Cole, who are well known in iron ore mining circles. Extracts from their testimony are presented below.

Statement of Don H. Bacon

[After eliciting from Mr. Bacon that he is at present residing in New York City, that his first employment in or about mines was as a telegraph operator at the Cleveland Mine, Ishpeming, Mich., in 1869, and that he had successively been timekeeper, clerk, assistant superintendent and superintendent, in active charge of mining operations from 1880 to 1887, it was learned that he became manager of the Minnesota Iron Company in 1887, remaining until January, 1901.]

MR. YOUNG. Were you familiar with the extent of the ore bodies owned by the Minnesota Iron Company at the time you left its employment, so far as they had been developed?

MR. BACON. We believed that we had 247,000,000 tons.

MR. YOUNG. How much of this was on the Mesaba?

MR. BACON. All, with the exception of 4,000,000 or 5,000,000.

MR. YOUNG. Had there been any shipments at that time from the Mesaba?

MR. BACON. No.

MR. YOUNG. The Minnesota Iron Company had no interest in the railroad running into the Mesaba Range at that time, had it?

MR. BACON. Yes. The Minnesota Iron Company owned the railroad. It had built the Duluth & Iron Range to reach its own properties.

THE CHAIRMAN. They also reached the property of other concerns at the same time, did they not?

MR. BACON. I do not recall.

THE CHAIRMAN. Did you tap the Mesaba Range at the same time you did the Vermillion?

MR. BACON. We reached the Vermillion Range some eight years earlier.

Goes to the Tennessee Company

MR. YOUNG. When you left the Lake Superior district January 1, 1901, where did you go?

MR. BACON. With the Tennessee Coal, Iron & Railroad Company.

MR. YOUNG. You went there in what capacity?

MR. BACON. Chairman of the board of directors.

MR. YOUNG. How long did you remain with the company?

MR. BACON. Until May, 1906.

MR. YOUNG. You had a rail mill?

MR. BACON. Yes, so-called.

MR. YOUNG. Why do you use that term?

MR. BACON. Well, it was a very indifferent mill.

MR. YOUNG. It was not an efficient mill?

MR. BACON. No. When I use the word "mill" I am referring to the whole plant, and not to the rail mill particularly.

MR. YOUNG. The whole plant was inefficient?

MR. BACON. Yes. I would say of the rail mill itself, where the steel was rolled into rails, that that unit was very good, but the open-hearth department was very poor.

MR. YOUNG. What did the plant consist of?

MR. BACON. Ten open-hearth furnaces, one rail mill, 13 blast furnaces, one blast furnace at Whitwell, Tenn., and two at Sheffield, Ala.

MR. YOUNG. What is the character of the ore in the Birmingham district that was owned by your company?

MR. BACON. The larger part is known as red ore, and carries from 36 to 37 per cent. metallic iron.

MR. YOUNG. Is there any Bessemer ore at all in that district?

MR. BACON. I do not know of any.

Railroad Ownership

MR. YOUNG. In 1906, when you left the Tennessee Company, did it then own any railroad property?

MR. BACON. No.

MR. YOUNG. Had it at any time previous to that?

MR. BACON. Yes. It was known as the Birmingham Southern and had been sold by the Tennessee Company prior to my going there. Over it most of the coal and coke was brought from the mines and coke ovens to the furnaces at Ensley and Birmingham, and it hauled freight and supplies of different kinds from the railroads at Birmingham out to Ensley.

MR. YOUNG. Do you know what reasons led to the sale of that railroad by the company?

MR. BACON. The reason given for selling was the belief that the purchasers, which were the Southern and the Louisville & Nashville railroad companies, could operate it or would operate it at less cost per ton of movement that the Tennessee Company was operating it.

MR. YOUNG. How did that work out in practice?

MR. BACON. It was rather discouraging to the sellers because the cost of movement was high.

MR. YOUNG. That was the cost that was charged by the railroad companies to the Tennessee Company?

MR. BACON. Yes.

MR. YOUNG. Do you remember what it was?

MR. BACON. It varied for the different things done. I do not remember the cost per ton. The charges were not made per ton, but the total cost each month for the movements.

The Company's Iron Ore Deposits

MR. YOUNG. At the time you left the company, what do you know of the extent of its deposits of iron ore?

MR. BACON. We believed we had about 400,000,000 tons of iron ore.

MR. YOUNG. You do not include ores of too low grade to be used?

MR. BACON. No.

MR. YOUNG. What proportion, if you know, of the available ores of the Birmingham district was at that time owned by the Tennessee Company?

MR. BACON. An answer to that will involve some explanation. There is a valley known as Shade's Valley, and the mines that were being operated were being extended from the crest of Red Mountain down under that valley, and extended along the crest for a distance of 15 miles or more. From the mines extending along there for 15 miles the furnaces then got their supply of red ore. Taking the 15 miles that was then being operated, and assuming that the ore extended over to Shade's Mountain, which has since been proved by drill holes, and which we believed at the time to be true, the Tennessee Company owned about 30 to 33 per cent. of that valley, but its body of ore extends much farther than the 15 miles, getting somewhat thinner as it extends farther, sometimes richer—a little higher in iron content—and the mining had been carried a much longer distance to the northeast, and probably will be again.

In addition to the ore I have described, the Tennessee Company owned some deposits of brown ore. The brown ore is usually a little higher in iron, running about 45 per cent., but the deposits—those owned by the Tennessee Company—were, in no case, very large, and were not very reliable.

THE CHAIRMAN. About how many tons do you suppose you had of brown ore?

MR. BACON. We thought we had something like half a million tons, but we never considered such ores a very valuable asset, because they were so unreliable in quantity and variable as to quality.

Cost of Making Pig Iron and Rails

MR. YOUNG. Do you remember what your costs to manufacture pig iron were while you were in charge of the company?

MR. BACON. Well, they were rather high. Of all the furnaces that were there when I went there, none was modern. We built a furnace which we started in 1904, that was modern and very well equipped. At that furnace we made a very good cost, but the old furnaces always made a high cost.

MR. YOUNG. About what was that cost in the old furnaces?

MR. BACON. I should say between $10 and $11.

MR. YOUNG. What cost did you get down to in your new furnace?

MR. BACON. We did it at about $7 a ton. Perhaps I ought to make that a little higher, considering repairs from time to time.

MR. YOUNG. Under $8, was it?

MR. BACON. Yes, say under $8.

MR. YOUNG. Do you remember what the cost of the manufacture of your rails was?

MR. BACON. Nearly $30; between $25 and $30.

MR. YOUNG. You attribute those costs largely to the condition of your plant?

MR. BACON. Yes, our rail cost was excessive because of the plant being imperfect.

MR. YOUNG. Now, in figuring these costs of pig iron, what did you charge up for the value of your ore?

MR. BACON. We charged the cost of the ore, plus 5 cents a ton royalty.

MR. YOUNG. Were you paying any royalty?

MR. BACON. No.

MR. YOUNG. That is, you figured that your ore was worth 5 cents a ton in the ground.

MR. BACON. Yes.

MR. YOUNG. What did you figure as the value of your coal?

MR. BACON. We charged 5 cents for it. In both cases those were arbitrary sums.

The Company's Coal Properties

MR. YOUNG. What was the extent of your coal deposits at the time you left there?

MR. BACON. We thought that on the lands of the company in Alabama and Tennessee we had probably 1,000,000,000 tons of coal.

MR. YOUNG. What relation did your coal bear in quantity to the entire coal of the district, if you know?

MR. BACON. I do not suppose we had to exceed one-tenth. Maybe not more than one-twentieth, and coal has been discovered since I left there. Possibly the company does not own now more than one-fiftieth.

MR. YOUNG. Was this coal in a few hands or in many hands?

MR. BACON. Many hands.

Company Lacked Money to Improve Its Plant

MR. YOUNG. What was the reason your company did not improve its plant?

MR. BACON. It did not have the money.

MR. YOUNG. Why didn't you do it out of your profits?

MR. BACON. They were too small.

MR. YOUNG. Where did you sell your pig iron?

MR. BACON. Quite a good deal at Cincinnati; some at Detroit and St. Louis, and occasionally some in New England and different points between—some in Philadelphia.

MR. YOUNG. You sold some through the South, did you not?

MR. BACON. A very small tonnage indeed. The consumption in the South was almost nil. That was an agricultural country, you know, with very few foundries and no large manufacturing shops. So we never thought of the district south of Birmingham as offering a market.

MR. YOUNG. Did your company pay dividends?

MR. BACON. A part of the time.

MR. YOUNG. What was its capitalization?

MR. BACON. I think it was $23,000,000.

MR. YOUNG. What dividends were paid?

MR. BACON. We paid 6 per cent for a short time.

MR. YOUNG. What year?

MR. BACON. I think it was 1905, or perhaps 1904.

MR. YOUNG Did you stop after that?

MR. BACON. When the new people took the property they stopped.

MR. YOUNG. When did they take it?

MR. BACON. I think they bought the control in December, 1905.

MR. YOUNG. And you remained until what time in 1906?

MR. BACON. Until May, 1906.

THE CHAIRMAN. Have you had any experience in the construction of open-hearth furnaces?

MR. BACON. No, I have not.

Commends the Purchase by the Steel Corporation

MR. BARTLETT. The property was not paying dividends, or had not paid any dividends, and stock that sold at par would be a pretty valuable stock in 1907, would it not?

MR. BACON. I thought it was a wise purchase for the Steel Corporation to make.

MR. BARTLETT. Why?

MR. BACON. Because, in my opinion, it could be made a good earner. We estimated when I was there it would take $25,000,000 to rehabilitate the property and put it on a paying basis. There was scarcely any of the property that was right, if it was possible for it to be wrong.

MR. BARTLETT. That estimate you made of putting $25,000,000 on it to put it upon a paying basis—what would you estimate its value then?

MR. BACON. I think the stock was selling at that time for about $50. That would be about $11,000,000 for the stock and the indebtedness. The bonds, I think, were about $12,000,000.

MR. GARDNER. Is not this the fact, that the great value of that property was what was under the ground, not what had been put by man on top of the ground?

MR. BACON. Yes.

MR. GARDNER. And even if you did not have a cent's worth of machinery there, and that practically all you had on top of the ground was worthless, you say that what you had under the ground was worth something?

MR. BACON. Yes.

MR. GARDNER. And that was what made your stock worth $50 a share when John Gates bought you out?

MR. BACON. Yes. We had some 15 furnaces and at only one of those, when I left there, could pig iron be made at a fair cost. Only two or three of our coal mines were properly equipped to produce cheap coal. Our coke ovens were not of the best, and only a few of our iron mines were so equipped that we could mine iron ore cheaply. When I say cheap, I mean comparing it with other up-to-date districts.

MR. BARTLETT. Were you further behind than the Woodward, for instance?

MR. BACON. In many respects we were not behind the Woodward, but I am comparing them with like properties in the North.

MR. BARTLETT. Do you consider this property was worth all the Steel Corporation paid for it?

MR. BACON. I would not say that. I think if the stock had been thrown on the market it would have sold at $40; maybe $30.

MR. BARTLETT. Yes, at that time probably. But it was a wise investment for the corporation?

MR. BACON. I would say, as against my opinion, that some of the directors of the Steel Corporation, who are my superiors in their knowledge of the business, have not been favorable to the purchase. They doubted the wisdom of it as a money-maker; doubted the wisdom of the purchase.

THE CHAIRMAN. To what extent is the ore in the Birmingham district held by iron and steel manufacturing concerns of one kind or another?

MR. BACON. I doubt if more than half of it is so held. As I testified previously, the Tennessee Company owns in Shade Valley between 30 and 33 per cent. of the land, and the other iron companies own some, but a great deal of the land is owned by individual farmers.

The Quantity of Ore Needed for a Large Steel Plant

THE CHAIRMAN. If you were going to operate a large steel plant, one that could compete with the Tennessee and some of these other companies, how much ore would you consider was necessary as a reserve before embarking on that sort of an enterprise?

MR. BACON. A steel plant that could meet competition fairly well ought to produce at least 50,000 tons a month. In order to get costs down fairly well, that would mean, calling three tons roughly of ore to a ton of pig iron, 72,000,000 tons of ore to run 40 years.

MR. YOUNG. You ought to have 100,000,000, ought you not?

MR. BACON. Yes, and that would be good for only 50 years.

MR. GARDNER. Could you make steel rails profitably without having a larger plant than that?

MR. BACON. I think if everything was in good shape 50,000 tons a month would be sufficient.

MR. GARDNER. Seventy-two million tons of ore is a 40-year supply. Is that a sufficient reserve to induce you to go into the business?

MR. BACON. No.

MR. GARDNER. How much or how large a supply would you want?

MR. BACON. I would want ore there for 100 years. Because out of that 40 years I would have to get my capital back.

MR. GARDNER. Where could you get 180,000,000 tons of Southern ore?

MR. BACON. I think you can find it in Birmingham.

MR. GARDNER. In convenient situation where a business man would want it?

MR. BACON. The same as other people are working.

MR. GARDNER. That is not a piece here and there, but all together.

MR. BACON. All in one body

MR. GARDNER. Could you find it in the Lake Superior region?

MR. BACON. I think so.

MR. GARDNER. Where?

MR. BACON. On the Hill leases, doubtless.

MR. GARDNER. Oh, yes. But outside of the Hill leases, I mean.

MR. BACON. I do not know. Mr. Sellwood can testify on that point much better than I can.

MR. GARDNER. There is one question I would like to ask. It has no bearing really on the question of whether the Steel Corporation and these other steel companies have a monopoly. But it is a question of what the world has got to face in the future. I understand that in the Lake Superior region there is plenty of 20 and 40 per cent ore; that is, the whole surface of the ground is cheap ores. Is that correct?

MR. BACON. There is a great deal of ore there that could not be shipped to market now.

MR. GARDNER. Is there an unlimited amount of ore in the Lake Superior region—I mean good for a couple of hundred years if you could use that 40 per cent ore?

MR. BACON. Well, for a good many years. I would not say for 200.

THE CHAIRMAN. I think, Mr. Gardner, you are laboring under a misapprehension there. My understanding is that the low grade ore and the high grade ore are all in the same mine, and that the ore as discovered, low and high grade, is now in the hands of the steel companies. They simply take out some of it and leave the rest.

MR. GARDNER. Very likely that is true. I am not coming at it from the question of competition and monopoly. It does not make any difference who owns it.

THE CHAIRMAN. Oh, I see. You are getting at the question of supply.

MR. GARDNER. At present about 55 per cent is what they generally use, in Bessemer ore?

MR. BACON. I presume that is as high as the average would be now.

MR. GARDNER. Suppose they had to use 40 per cent. Suppose the other was worked out. Would it cost twice as much to make a ton of pig iron out of 40 per cent ore as it would cost to make it out of 55 per cent ore?

MR. BACON. I should say not. Bearing on that point, inventors are all the time perfecting machines for separating the iron from the silica, by crushing it. An ore the use of which would have meant a loss to a blast furnace a few years ago can now be used. And an ore which today would mean a loss I have no doubt in a few years will be used at a profit.

MR. GARDNER. I understand that.

MR. BACON. And that enlarges all the time the ore that we have in reserve.

MR. GARDNER. All right. We can make allowances for that. But I want first to find out if it happened today, with present methods, how much more it would cost to produce a ton of pig iron from 40 per cent. ore than it would to produce a ton of pig iron from 55 per cent. ore?

MR. BACON. I cannot tell you.

Statement of Thomas F. Cole

[The usual preliminary questions brought out the information that Mr. Cole, who resides in Duluth, was born in northern Michigan in 1862, began working in 1870, for many years was employed as a laborer, started in a clerical capacity at the Calumet & Hecla mines in 1884, went thence to the Chapin as chief clerk and cashier, in 1889 took charge of the Queen Iron Mining Company's operations in Michigan, Wisconsin and Minnesota, and in 1897 engaged with the Oliver Iron Mining Company, of which he was made president on the organization of the United States Steel Corporation, retiring from that connection three years ago.]

MR. YOUNG. Are you familiar with the question of the Lake Superior ore holdings of the Steel Corporation?

MR. COLE. I was fairly familiar until three years ago.

MR. YOUNG. What would you say as to a fair estimate of its total holdings on the Mesaba Range?

MR. COLE. Excluding the ore on the lands covered by the so-called Hill lease, I should say that the Steel Corporation's holdings on the Mesaba and Vermillion ranges, both in Minnesota, would be in excess of 750,000,000 tons, of which all but probably 20,000,000 to 25,000,000 tons is on the Mesaba.

MR. YOUNG. Could you give an estimate of its holdings in Michigan? I think that according to Mr. Finley's estimate it was shown as a little over 54,000,000 tons.

MR. COLE. I should say that its holdings in Michigan are very close to the figures he has given, as far as known tonnage at this time is concerned.

MR. YOUNG. Is that greater or less than the known tonnage at the time you left the corporation?

MR. COLE. I should say it is somewhat in excess of the known tonnage at that time.

Ore Holdings of Independents

MR. YOUNG. Would that statement also apply to the independent holdings in the Michigan ranges?

MR. COLE. Yes.

MR. YOUNG. Could you make any estimate of the ores on the Mesaba Range owned by independent operators?

MR. COLE. Excluding the ores in the lands covered by the so-called Hill lease and putting that in as independent ore, I should say that the ore holdings on the Mesaba Range held by the independents were nearly equal to the amount held by the Steel Corporation.

MR. YOUNG. Could you form a judgment as to the value per ton of all of the ores on the Mesaba, averaging this tonnage that you speak of?

MR. COLE. There is a great difference of opinion as to the value of ores in the ground as an inert mass lying there. Except to be held in reserve, to be taken out over a period of years and manufactured into iron and steel, to make it commercially valuable, it is of but little value, but when held as a reserve, I should say that it would be reasonable to put a valuation of somewhere between 30 and 50 cents per ton on ore now rated as merchantable.

MR. YOUNG. Some question has been raised as to why the Steel Corporation should have taken the Hill lease when it had such large tonnages, stripped and ready to ship out, at the time it acquired that lease. Can you throw any light on that question?

The Fluctuating Demand for Ore

MR. COLE. The Oliver Iron Mining Company, which was the operating company, handling the work of mining, preparing the mines, getting the openings advanced, and getting them all equipped and in shape for production, so that the ores could be mined, graded and transported during the shipping season, always had to be prepared for what we call emergencies. For instance, at one time I know they called upon us in the midst of a shipping season for an increase of 80 per cent. in shipments, and within three days that ore was being forwarded, the additional ore as well as the regular amount. Therefore, it is necessary and essential that mines be developed away ahead of actual needs for the possibilities. At times, when the demand for steel products was great in this country, we would be called upon for very large additional tonnages of ore, and it had to be forwarded during the months of open navigation.

MR. YOUNG. Was that one of the reasons for doing this preparatory work ahead, so that you would be enabled to meet emergencies of that kind?

MR. COLE. Not only to meet any certain emergency that came upon the situation up there, but to meet the extraordinary demand that may be entailed during an entire year. In years of great prosperity we had to be in a position to furnish very large tonnages of the material, all graded, so that it could be used and converted into steel and sold. Therefore, the mines had to be opened and developed away ahead of the apparent actual needs, at some periods.

MR. YOUNG. What was the policy of the Oliver Iron Mining Company, operating for the Steel Corporation, as to the use of the lower grade of ores?

MR. COLE. In our mining operations we conserved the ore material that had very low iron contents. We either left it in such state that it could be secured in later years as our mining operations progressed, or we took it out and deposited it at some convenient point on the surface, so that it could be secured afterward. Whenever it could be consumed we also consumed large quantities of fairly low grade material.

Was the Hill Lease a Move Toward Monopoly?

MR. YOUNG. The suggestion has been made, either directly or by innuendo, a good many times, that the only purpose the United States Steel Corporation could have had for acquiring the Hill lease was to monopolize the ores of the Lake Superior district. I would like to have any suggestion that you could make along that line, as to whether or not that was true, and if it were not true, to go into fully the reasons for the acquiring of that property in the manner in which it was acquired.

MR. COLE. The ore deposits on the Mesaba Range, as a rule, are covered only with glacial drift. They are flat-lying, and can be readily explored by the use of churn or diamond drills, the surface covering removed from over the ore bodies, and the ore, or at least quite a large percentage of it, mined with steam shovels, making the mining cost reasonably low, very much lower than the cost for mining iron ores on the so-called older

ranges, such as Vermillion in Minnesota and the ore ranges in Wisconsin and Michigan. The lands that Mr. Hill proposed to lease to the United States Steel Corporation were all located on the Mesaba Range. We felt that there was a very considerable tonnage of high-grade ore existing on these lands. We believed that it could be won at a very reasonable cost. We differed with the opinion of the engineers employed by Mr. Hill as to the probable quantities of ore on the lands. We made estimates of what the probable tonnages would be. We based our estimate on what exploratory work and other work had been done on the land. Exploratory work had been conducted on contiguous land, and we based our estimates on that also, and our engineers could not agree with the estimated tonnages of the engineers that Mr. Hill had in his employ.

As a business proposition, with a surrender clause in the lease, and the fact that the ores on that range could be won at a very much lower mining cost than on the old ranges, we felt that it would be wise to secure that ore territory, explore it thoroughly, and be guided by the result of those explorations as to whether the lease would be held beyond the 1915 period or not. We felt that we could not lose any money, that we surely would get ore enough to justify the expenditure of exploring and developing the mines, necessary to take the quantities out that were called for by the lease, without loss to the company, and therefore that it would be a good business proposition to secure those lands and ascertain if they contained the very large tonnages that Mr. Hill's engineers estimated were in the lands.

MR. REED.—How much did they estimate it?

MR. COLE.—Their talk, as I understand it, at the time was 500,000,000, 600,000,000, or possibly 700,000,000 tons; maybe more.

MR. YOUNG. How many years' reserve did you figure that you had in your own holdings, aside from the Hill lease, taking into consideration the probable growth in the demands or requirements?

MR. COLE. We figured, as far as its rated merchantable ore was concerned, we probably had 40 years' supply at the then rate of reduction, allowing pretty liberally for extensions of ore bodies and probably new ore bodies that we would find.

MR. YOUNG. Considering the amount of investment the corporation had in the plant, did you not regard from 30 to 40 years' supply as eminently sufficient?

MR. COLE. Any concern as large as the United States Steel Corporation ought to figure as far ahead as it possibly could figure, to be in a position to meet its needs for a long period of years. Forty years is a very short time in the world's work.

Cost of Developing the Hill Deposits

MR. YOUNG. Has it been expensive to develop these ores on the Hill lease property, strip them and get them in shape?

MR. COLE. No. The ore bodies that contain good merchantable ore could be exposed, the surface covering removed, at a very reasonable cost per ton.

MR. YOUNG. Have you any estimate of the cost to do that?

MR. COLE. The work was started before I left the employ of the Oliver Iron Mining Company. I should say that a figure around 12 cents per ton of ore uncovered would nearly pay for all the expenses of development. You would have to charge the plant equipment in addition to that, which would be utilized in removing the ore after the surface stripping was removed.

[Here numerous questions regarding Cuban and Brazilian deposits of iron ore were asked, to which Mr. Cole responded in a manner showing that he had paid much attention to ore supplies outside of this country.]

MR. YOUNG. Have you any knowledge in regard to the Utah ore situation?

MR. COLE. Only through the report of the engineers.

MR. YOUNG. Engineers that you sent out to look it over?

MR. COLE. Yes. From the information received from those engineers there are very large tonnages of ore in southwestern Utah, in Iron County.

MR. YOUNG. Where could that ore be smelted?

MR. COLE. I do not know of any place at the present time where it would be profitable to erect blast furnaces to use it, because of the fact that Salt Lake City, like Galveston and New Orleans, is not at this time a distributing point for large quantities of steel or iron products. But when the time comes that Salt Lake City can distribute large quantities of that material, I see no reason why the ores cannot be sent up to the valley of the great Salt Lake and there meet the coking coal from Wyoming and from Utah mines and be reduced into iron, made into manufactured shapes, and sold.

Statement of Joseph Sellwood

MR. YOUNG. Mr. Sellwood, what was your first experience in and about mines, and when?

MR. SELLWOOD. I commenced to work when I was about nine years old in the mines of Cornwall, England. I came to America when I was about 18, in 1865. I went to the copper country in Michigan, working underground as a miner. From Ontonagon County I went to Marquette, Mich. I worked for eight years at the Cleveland mine and the New York mine at Ishpeming. [Mr. Sellwood recounted his experience in Lake Superior iron mining at the Dexter, Argyle, Boston, Paschal and Champion mines on the Marquette range; then at the Colby mine at Bessemer, Mich., later (1888) going to Minnesota to open up the Chandler mine for the Minnesota Exploration Company and the Minnesota Iron Company jointly. He was with the Minnesota Iron Company until 1897. Since that year he has managed different mines of his own and of Pickands, Mather & Co., also doing some work for the American Steel & Wire Company under the Gates regime.]

MR. YOUNG. You have seen that whole business grow (Lake Superior iron mining), have you not, from a little nucleus at Ishpeming and Negaunee to its present proportions?

MR. SELLWOOD. I have seen it grow from an output of about 500,000 tons to 43,000,000 tons.

MR. YOUNG. Have you been connected with the making of estimates as to the amount of ores in the Minnesota ranges?

MR. SELLWOOD. Yes, sir. It was virtually my business after I left the Chandler mine, from 1892 until 1897. I was working for the Minnesota Iron Company or the Duluth & Iron Range, and picked up all the properties for them, and all the properties of the American Steel & Wire Company on the Mesaba range, and also on the Marquette and Menominee afterward.

Mesaba Ores 1,300,000,000 Tons

MR. YOUNG. What, in your judgment, is the extent of the deposits on the Mesaba range of available ores to-day?

MR. SELLWOOD. I would say anywhere from 1,300,000,000 to 1,400,000,000 tons.

MR. GARDNER. I would like to know what the witness understands by the word "available."

MR. SELLWOOD. All that is developed.

MR. GARDNER. That is, that can be used—of sufficient metallic content so that it can be used by present known methods?

MR. SELLWOOD. I just include what is known of; but the country is very well developed. There has been very little ore discovered there in the last three or four years.

MR. YOUNG. About what proportion of the ore of the Mesaba is owned by the Steel Corporation, leaving the Hill leases entirely out of calculation?

MR. SELLWOOD. According to the Tax Commission's estimate of May, 1902, there is about 550,000,000 tons, and that is pretty near correct according to my own judgment.

THE CHAIRMAN. What does the Tax Commission estimate the ore there?

MR. SELLWOOD. They estimate about—I think it is better than 1,300,000,000 tons.

MR. YOUNG. One billion three hundred and sixty-eight million tons, according to their last report made in 1911.

MR. SELLWOOD. They made it a little more, I think, Mr. Young, last year than it was two years ago. It was not because they found more ore, but the Tax Commission took hold of that about five or six years ago, and at that time a good many of the independent miners put in a too low estimate, and they revalued it—sent men from the university to examine all the blueprints and all the mines, and in that way brought up the amount of ore. It is not that they have found much more since that time. They found that the miners or operators put in too low an estimate in the first place.

MR. YOUNG. They were anxious, I suppose, to get off with as light taxes as possible.

MR. SELLWOOD. Yes.

MR. REED. Are you speaking of the Steel Corporation when you speak of the miners?

MR. SELLWOOD. No, sir. I referred more especially to the independent operators. The Steel Corporation always has been very fair.

MR. YOUNG. About how much ore is there on the Vermillion range?

MR. SELLWOOD. The Vermillion range is not as easy to estimate, because the veins are vertical; but it is very small compared with the Mesaba. I do not think that any one would go on record for more than 25,000,000 or 30,000,000 on the Vermillion range. No one can see half of it. I would not put it to exceed 20,000,000.

MR. REED. The Tax Commission put it about 8,000,000 tons.

Value of Mesaba Ore in the Ground

MR. YOUNG. There has been a great deal of contradictory testimony here about the value of these properties. One witness has testified that he regarded 10 cents a ton as a good, liberal price for ore in the ground in Minnesota. Mr. Hill, on the contrary, testified that he thought his ores on what was known as the Hill lands were worth from $1.50 to $2 a ton. We have all sorts of figures in between. The last figures of the Minnesota Tax Commission value the Minnesota mining properties at $232,000,000. And they say that that they regard as about 40 per cent. of their value. That would bring it up to about $560,000,000. I would like your estimate as to what those properties are worth now.

MR. SELLWOOD. Well, that question is pretty hard to answer. In the first place there is a difference of 75 cents a ton between the Bessemer and non-Bessemer in the market. Then you might get a mine that is high and dry, and you could strip it, which would be worth a good deal more than if underground, and you had to pump. The Minnesota Tax Commission as a rule assesses all real estate from 40 to 50 per cent. of its value, and they have assessed the value of these ores from 14 to 33 cents.

[Mr. Sellwood here submitted a statement giving the Minnesota Tax Commission's 1909 estimates of the ore in each of the properties on the Mesaba range, with assessed value per ton. These values range from 14 to 33 cents. Nearly all were valued under 25 cents and the large majority under 20 cents. Some of the larger properties are the following: Rust, 71,000,000 tons at 21 cents and 5,000,000 tons at 10 cents; Adams, 23,000,000 tons at 23 cents; Mahoning, 51,000,000 tons at 21 cents and 22,000,000 tons at 33 cents; Hull, 37,000,000 tons at 21 cents and 13,000,000 tons at 33 cents; Monroe, 32,000,000 tons at 14 cents; Morris, 26,000,000 tons at 30 cents; Leonard, 11,000,000 tons at 23 cents; Leonidas, 10,600,000 tons at 15 cents; Susquehanna, 8,500,000 tons at 10 cents and 12,800,000 tons at 14 cents; Sauntry-Alpena, 32,000,000 tons at 15 cents; Scranton, 19,000,000 tons at 8 cents; Gilbert, 12,000,000 tons at 15 cents; Shenango, 10,000,000 tons in three classes—10, 14 and 19 cents; Shenango prospects, 5,000,000 tons at 8 cents; Grant, 8,000,000 tons at 23 cents.]

MR. YOUNG. Now, I want to know how your own judgment, being a man who has had large experience in buying and selling these properties, agrees with these figures.

MR. SELLWOOD. Now, Mr. Young, it is a great big question. You take a large body of ore, 100,000,000 tons, and put it in at $1 a ton, and pay interest, and see what it would amount to. It is a different proposition if you have a small property, 5,000,000 tons, where you can take it out in two or three years. There is a great deal of difference between taking 50 cents a ton cash for the 100,000,000 tons of ore, and waiting a hundred years and getting a dollar.

THE CHAIRMAN. Right at that point, what can you buy the ore for, say, if there is any of it left?

MR. SELLWOOD. There is not 10,000,000 or 20,000,000 tons of deposit left on the Mesaba that can be bought now. There are properties of 500,000 or 600,000 tons up to 2,000,000 or 3,000,000 tons, but none of that is ever bought for cash. I sold a piece of property to Jones & Laughlin five or six years ago, about 8,000,000 tons. We were paying a royalty of 36 cents a ton. I sold it to them for $2,000,000 and I took their notes payable $100,000 a year, with 5 per cent. interest. I could not have gotten $1,000,000 out of it in cash.

THE CHAIRMAN. Here is what I am trying to get at. You find 25,000,000 tons in a body, and instead of leasing you purchase. You say, "I want to buy this 25,000,000 tons of ore." What would be a fair price for that ore to buy it all in one lot, whether you pay for it in notes or cash?

MR. SELLWOOD. I do not think I would pay over 25 or 30 cents a ton, but I would rather pay $1 a ton royalty.

MR. GARDNER. That particular ore you are speaking of there (Jones & Laughlin) was evidently worth 61 cents in the ground?

MR. SELLWOOD. Yes, sir. But that was a Bessemer ore and a stripping proposition. You could mine it with a steam shovel. It would average better than 60 per cent. in iron and 0.04 to 0.05 per cent. phosphorus.

MR. GARDNER. The price of ore lands has advanced a great deal in the last ten years, has it not?

MR. SELLWOOD. Yes, in ten years.

MR. GARDNER. Has it advanced enormously?

MR. SELLWOOD. No, not very much. You take a year like this and you can hardly sell any product. We are getting $1.10 a ton less today than we got two years ago for ore.

MR. GARDNER. In the opinion of the Minnesota Tax Commissioners, ore lands are valued at from 14 to 33 cents, and that is 40 to 50 per cent. of their true value?

MR. SELLWOOD. I did not say that. I say they assess real estate generally at from 40 to 50 per cent. That is supposed to be what they do.

MR. GARDNER. That figures out from 35 cents minimum to 60 cents maximum a ton in the ground?

MR. SELLWOOD. Yes.

Value of Steel Corporation Ore

MR. GARDNER. You are aware that in 1902 in court proceedings the Steel Corporation valued 700,000,000 tons at a round figure of $1 a ton in the ground.

MR. SELLWOOD. I heard so.

MR. GARDNER. Does that strike you as being a conservative valuation?

MR. SELLWOOD. No, I think it was very excessive.

MR. GARDNER. Do you think you could have bought it at 30 cents a ton at that time?

MR. SELLWOOD. Not all of it, but a good deal of it.

MR. GARDNER. I call your attention to the fact that a great deal of that was leased. I think several hundred million tons was leased land. On some of it they were paying royalties. I think in the State of Minnesota they were paying 25 cents royalty at that time. About half, at the utmost, was owned in fee, if I recollect aright. Now, then, taking that into consideration, that one-half is owned in fee, the other half on leases, have you ever formed any estimate which would enable you to say what a fair valuation of those 700,000,000 tons would have been in 1901?

MR. SELLWOOD. No, I do not know that I have; but it would not have been worth anything near that amount. It could be bought for much less at the time. There is an awful difference between paying 25 cents a ton on ore when you take it out and buying it in fee for 25 cents. As a matter of fact, where you buy a piece of ore where the interest is more on it than the royalty, you had better pay the royalty.

THE CHAIRMAN. I have heard it stated by gentlemen who owned some ore properties out there that on the average the fee is worth about 33 1/3 per cent of the royalty per ton. That is, if it is leased at 25 cents a ton royalty, and it is a large body of ore, the fee to it would be worth 8 cents a ton.

MR. SELLWOOD. That is right. That is the basis we figure on.

MR. GARDNER. That would depend a good deal on the length of time.

MR. SELLWOOD. Yes That is the figure we have used there.

THE CHAIRMAN. That is for 25 years?

MR. SELLWOOD. Yes, sir. That is about the basis they settle on.

MR. YOUNG. Well, Mr. Sellwood, here is another thing you have to consider. It is not always the length of the lease, but it is the amount of the ore and how fast you will probably use it.

MR. SELLWOOD. That is the idea exactly.

Ownership of Mesaba Range Ores

MR. YOUNG. Now, we did not quite finish your examination with regard to the quantity of these ores. You estimated that on the Mesaba the Steel Corporation had about 550,000,000 tons. Could you estimate about what ore there is on what are known as the Hill properties?

MR. SELLWOOD. I would say at least 250,000,000 tons. That is taking all the lands Mr. Hill owned and those he leased to the Steel Corporation which he did not own, such as Longyear, Bennett and Chisholm. I should figure 100,000,000 tons of it belonged to outsiders.

MR. YOUNG. That would make about 800,000,000 for the Steel Corporation and the Hill lands. That would leave 550,000,000 to 600,000,000 tons for the other owners, on your figures. Do you know about how that is divided up?

MR. SELLWOOD. I can give you a rough estimate. The Mahoning has at least 150,000,000 tons. Of this the Cambria Steel Company has a half, and I think the Steel Corporation has one-sixth. Snyder's properties are about 50 millions; Jones & Laughlins', 75 million tons; Pickands, Mather & Co., 75 million tons. I think Corrigan, McKinney & Co. have 50 million. I would say the Rogers interests have about 25 million; the Wisconsin Steel Company, 20 million; the Biwabik has 10 millions, owned by the Brier Hill Company. I would say that M. A. Hanna & Co. have 50 million tons. I put in all the others, the little fellows like myself, at 50 million tons. I do not know how that will figure out, but in round numbers that is about where it is.

[When the examination of Mr. Sellwood was resumed on Friday a list of Steel Corporation properties on the Mesaba range was presented by Mr. Sellwood, as copied from the Minnesota Tax Commission's report for 1909, showing the total of estimated reserves to be 523,547,252 tons.]

(*Continued on page* 1006.)

Large Corporations and Working Conditions

Discussions at the Meeting of the American Academy of Political and Social Science Have the Consolidations Met Expectations?

The sixteenth annual meeting of the American Academy of Political and Social Science was held at Philadelphia Friday and Saturday, March 29 and 30. The general topic treated by all speakers was that of "Competition and Combination in Commerce and Industry."

John Williams, Pittsburgh, president of the Amalgamated Association of Iron and Steel Workers, and John A. Fitch, one of the editors of the Survey, New York, argued that combinations in the iron and steel trade had not brought about any increases in the earnings of the workingmen employed by these combinations. They claimed that the purchasing power of wages in the industry today is less than the purchasing power of the wages earned by the workers previous to the combinations.

What the Steel Corporation Has Done

In rebuttal, R. C. Bolling, assistant general solicitor of the United States Steel Corporation, cited the large expenditures made by that corporation for prevention of industrial accidents, stating that these had been reduced 43 per cent. in six years and that this had resulted in a saving of 2000 lives. These efforts, he said, have already cost $2,000,000 and are costing $750,000 annually. He also made the statement that his corporation was spending annually, for the betterment of the conditions of the workers, about $5,000,000. Mr. Bolling, referring to the charge made by both Mr. Williams and Mr. Fitch, that the Steel Corporation had constantly declined to recognize collective bargaining, said that the corporation had fought and always would fight for the principle of the open shop. He stated that labor would always receive its market value. Formerly a considerable portion of Irish were employed in the steel mills. These men have progressed into a higher field of labor and their places have been taken by Slavs. As soon as the Slavs progress to a higher field it may be necessary to employ men of some other nationality whose market value as laborers is such as the industry can pay. In the meantime the Steel Corporation and other employees in the steel industry have been the medium by which the Irish laborers have advanced from a lower grade of work to a higher, and may also become the medium for the advancement of the Slavs.

Hon. James T. McCleary, secretary of the American Iron and Steel Institute, discussed the question, "Which is better for the workingman, big business or little business?" He gave illustrations showing that the man who has to earn his daily bread by his daily toil has more to hope for from big business, because it offers more chance to secure employment, because employment is more liable to be regular and continuous, because the conditions of employment are more likely to be safe and healthful, because wages are higher and the chances of promotion greater, and because better provision can be and will be made for such contingencies as accidents and old age.

R. S. Woodward, general manager of the Standard Roller Bearing Company, called atention to the grave menace of labor organizations, dictating the working habits and performance of the workers as well as the conduct of the employer's business.

In the general discussion Samuel Gompers denied the intimation that the labor leaders were self-appointed and seeking personal aggrandizement. He denied the statement that the labor movement stood for violence and lawlessness. He predicted most emphatically, however, that the policy of employment of ignorant foreigners at low wages would result in disturbances which neither labor organizations nor combinations of corporations could control. He claimed that this class of labor was being oppressed and that, while it was at present apparently quiet, this quiet was merely a lull preceding a storm. He intimated that the Steel Corporation was "living over a volcano, and that there might be a rude awakening from the present quietness of labor." This remark was taken to mean that the steel industry might yet have to reckon with the Industrial Workers of the World.

The Consolidations Have Not Made Good Their Promises

In discussing the subject of "Competition as a Safeguard to National Welfare," Prof. E. S. Meade, director of the Evening School of Accounts and Finance of the University of Pennsylvania, adversely criticised ex-President Roosevelt's scheme for an interstate trade commission with functions similar to those of the Interstate Commerce Commission. This scheme and similar ones, said Prof. Meade, were based on the assumption that it is desirable for the Federal Government to preserve for the public what are supposed to be the advantages of these combinations and to safeguard the public against their evils. The assumption underlying this programme of regulation that there are advantages to the public in these combinations is entirely unfounded, said Prof. Meade. The primary object of each of these combinations as set forth in their original prospectuses was to eliminate competition. The advantages of the elimination of competition, as set forth by the promoters were: 1, control of prices; 2, greater ability in dealing with the railroads; 3, closer relations with bankers and greater facility in obtaining new capital; 4, superior ability in dealing with organized labor. The combinations which were not formed with the idea of eliminating competition have nothing to fear under the Sherman law. The solution of this question should turn on the efficiency of these combinations. Here the evidence is entirely negative. There has been no proof brought forward that the trust is a superior form of business organization. All the evidence available points to the opposite conclusion. In so far as these combinations have been exceptionally profitable, as in the case of the oil, tobacco and powder combinations, their profits have been shown to have resulted very largely from the monopoly which they possess. For the most part combinations have not made a showing equal to that of the industries not so controlled. The prices of the common stocks of the trusts, that portion of their capitalization which represented the economies of the combination, are, as a rule, very low. With a few exceptions these combinations have not been able to realize the expectations which were formed concerning them. Why, then, should the trusts be continued?

Bruce Wyman, professor of law, Harvard University, argued for monopoly in industries that naturally develop as such and that there should be competition where there is a lawful chance for it.

Miles M. Dawson, actuary of the Russell Sage Foundation, New York, believed publicity of accounts of great industrial combinations to be one of the best remedies. This course has been very advantageous in Great Britain.

James R. Garfield advocated publicity, regulation and supervision of industrial corporations along lines similar to those in force regarding national banks.

J. K. Gwynn, of the American Tobacco Company, New York, stated the point of view and attitude of those responsible for the formation of industrial combinations. In the case of the Tobacco company, he said that ruinous competition was the chief incentive to combinations.

John Kirby, president of the National Association of Manufacturers, Dayton, Ohio, delivered a scathing denunciation of the American Federation of Labor, holding that organization directly responsible for the McNamara outrages and declaring that the organization must be crushed, as it is the greatest danger confronting the American nation today.

An address which elicited most pronounced applause was that of Hon. W. L. MacKenzie King, formerly Minister of Labor of Canada and author of the Combines Investigation Act. He described fully the purposes of that act and its application. Each individual case is subject to a special judicial investigation and decision by a board selected to consider that case. The aim is to prevent interference with the rights of the public at large, and if these have been interfered with to restore them to their original condition. H. D.

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Editors

Geo. W. Cope A. I. Findley W. W. Macon

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Growing Iron Ore Reserves

Dr. C. K. Leith, of the United States Geological Survey, makes the statement in a chapter for the forthcoming annual edition of Mineral Resources, that the ratio of iron ore reserves in Michigan to the shipments is likely to be maintained indefinitely in the future; in other words, that as much ore is likely to be discovered each year as is shipped. The three Michigan ranges, Marquette, Menominee and Gogebic, have to date shipped almost precisely a quarter billion tons of ore, and Dr. Leith found, in an extensive survey last summer, that there were 124,598,164 tons of high-grade ore in the mines and 44,982,938 tons in drilled areas, making a total reserve of 169,581,102 tons, not including high-silica low-phosphorus ores, even of 40 per cent. grade, which have been mined on both the Gogebic and Menominee ranges. Dr. Leith expresses the opinion, indeed, that the known reserves of the Michigan ranges are greater to-day than they have been at any time in the past. In other words, thus far the discoveries have kept ahead of the shipments.

Dr. Leith's conclusion will naturally prove a very comforting one to the iron trade; but another word of comfort may be added to his statement, and that is that inasmuch as the limit of workability is steadily pushed downward the reserves will really increase. Dr. Leith has regard only for ores of the present commercial limit, but that is not all of the story. To the present date the United States has produced, from all fields, a total of between 850,000,000 and 900,000,000 tons of iron ore. All the progress that has been made, from the Catalan forge and the cold blast charcoal blast furnace to the modern stack using comfortably a large percentage of dusty Mesaba ores, has been made during the consumption of this ore, less than a billion tons. It would be idle to adopt any such viewpoint as that when the trade has consumed another half billion or billion tons of ore its standard of workability will not have been lowered very materially.

The condition which Dr. Leith finds obtaining in the case of the Michigan ranges may be held as likely to obtain elsewhere. It may be expected that in many cases exploration will keep ahead of consumption, having regard only to ores of the present standard of workability, while beyond this assurance there is the certainty that as the years pass the iron trade will be glad to use ores of lower and lower degree.

It is well to observe in this connection that the extent of the visible supply of iron ore at a given time is not entirely one of geology, of what actually exists in the earth's crust, but of man's assiduity in discovering and proving it. As long as there is the certainty of a supply for a small number of decades, exploration is likely to proceed with considerable slowness, for the present worth of ore to be mined a quarter century hence is necessarily small in proportion to the value when it comes to be mined. The extent of the visible supply, then, as Dr. Leith takes pains to point out, will be largely a question of how much exploration work is done. If the interest of the trade in its far future decreases, discoveries may for a time not keep pace with shipments. If the interest increases, the discoveries are certain to be greater. Fortuitous circumstances may operate from time to time to increase the visible supply, or to allow it to decrease by the continued mining of ore. Thus the circumstance of the United States Steel Corporation leasing the Hill properties a

few years ago led to very important exploration work, in order to determine where mining operations should first be conducted. Without that circumstance those same properties would at this time show a smaller tonnage of reserves than is the case.

Alien Dependents and Workmen's Compensation

A bill now pending in the Rhode Island Legislature establishing for that State a system of workmen's compensation excepts from the benefits created by the law the dependents of an employee who are not, at the time of his death through accident, residing or domiciled in the United States or the Dominion of Canada. A dependent is a wife upon a husband with whom she lives at the time of his death; a husband upon a wife with whom he lives at the time of her death, and a child or children upon a parent, including adopted and step-children under the age of 18 years, or over that age but physically or mentally incapacitated from earning. According to the Rhode Island bill if the victim of a fatal accident leaves no such dependents in the United States or Canada the employer will pay the reasonable expense of the last sickness and the burial, which shall not exceed $200. It would matter nothing if he had a family in another country.

Apparently this section of the bill is aimed at workmen who come to this country with the intention of making their employment here only temporary, leaving their families abroad. There is a very large number of such persons in the United States. They labor hard and live with utmost frugality in order that they may accumulate in as short a time as possible a sum of money which for people of their class in their countries amounts to a competency. Should this provision be embodied in the law their families would be deprived of any right to compensation except such as might be obtained under the common law pertaining to employers' liability. The act, in common with those of most other States, places with the employer the option of establishing in his works either workmen's compensation or employer's liability. If, however, the former should be chosen by an owner and the dependents of a workman should be discriminated against in the matter of death benefits because they are non-residents, some question might arise as to depriving them of their right of action under employers' liability.

We will assume that an Italian workman whose wife and young children remain in their home country is killed in his employment here. His family are left by law helpless against recovery for damages, unless they are prepared to bring action under the common law. Their ignorance, especially of American laws and customs, would leave them sorely handicapped. After a few such cases had arisen a strong feeling of distrust would be engendered. The great majority of foreign workmen would not be able to understand the situation. The less clear the understanding between employees and manufacturers the greater the power wielded by the labor agitator. Numerous strikes in the East are proving this. It may be argued that a provision such as that under discussion would tend toward securing a more stable population, because men would be more likely to bring their families with them. But in practice the law would have little effect in securing such a result. Most of the practical students of workmen's compensation agree that the gain to an employer from such an exemption clause would be trifling compared with the harm that might be wrought.

The Individual Central Employment Bureau

Many manufacturing companies are giving attention to the question of a central individual employment bureau, and in some instances such a department is operating with undoubted success. In hiring men not enough care is taken in determining whether they are physically and mentally fit. The personal equation in the case of the foreman and even of the superintendent plays too important a part. Many of them are poor judges of men until they have seen them at work. Prejudices, favorable or otherwise, may militate against the interests of the company. In the small plant the owner has the opportunity to see the new man, and, in fact, often does the hiring himself. But when a working force passes a certain numerical point responsibility as to its make-up is scattered. An employment bureau, where all applicants for work are examined as to their fitness, centralizes responsibility in expert hands.

The new condition is made almost imperative where workmen's compensation is in effect. So long as the owners are financially responsible for all accidents, the factor of negligence being eliminated, it is impossible to overlook the question of the physical condition of men. A one-eyed man is necessarily in greater danger than a man of normal vision. A workman having heart disease may be killed or maimed in an acute attack of his ailment. Good work is being done in the investigation of the important matter of health in certain establishments, with the idea of procuring the greatest possible efficiency on the part of employees. Eventually these results will be generally applied in a practical way in the hiring of men.

A suggestion under consideration for one great manufacturing plant is that a central employment bureau be placed in charge of a man with duties analogous to those of a purchasing agent. He would be the official purchaser of labor. As an assistant he would have the services of a physician for a limited time each day. The trained eye of the doctor would tell pretty well the physical condition of the applicant. The successful applicant would be turned over to the department which has made requisition for his services, for a try-out of skill. Others may prefer a more extended physical test. It is not unlikely that the well-managed works of a few years hence will have an element of management kindred to this. The cost of workmen's compensation will compel the minimizing of injuries to employees; beyond this the better the average physical condition of workmen the greater the productive capacity of a plant.

Machinery Dealers and Auctions

An editorial in the March 21 issue of *The Iron Age* regarding sales of machine tools at auction has called out some discussion. The point made was that the machinery dealers, by their present policy of bidding on tools at these sales, contributed to the auctioneer's benefit against their own interest. As opposed to this opinion it is contended that the dealer is now best conserving his own interest by doing the very thing condemned. The reasons given are these:

Assuming that a dealer undertakes to buy up a lot of tools in competition with an auctioneer, it is apparent that the auctioneer's guarantee for the same

amount as a dealer's bid would be considered the more favorable offer and would be accepted. Furthermore, it is claimed that in buying up a lot of machinery one is forced to take in an assortment of odds and ends of little or no value in order to obtain the items that are worth while. Hence it is pointed out that to attempt to control in advance a particular lot of machinery that is likely to go to auction sale is not pre-eminently to the dealer's advantage. When the equipment goes to auction it is common for each dealer to fix the maximum price he is willing to pay for each particular item; and if the bidding carries the price above that estimate the dealer drops out and the consumer becomes the direct buyer.

It is claimed to be the experience that fully 60 per cent. of the tools at these sales go in this manner directly to the user, the prices, because of the thoughtless competitive enthusiasm aroused by the bidding, being much higher than the value of the machinery; and that it is from this 60 per cent. that the auctioneer makes his profit. The tools making up the remaining 40 per cent which goes to the dealers are frequently bought, it is claimed, at prices lower than the dealer's own maximum estimates. He thus not only obtains the tools he desires, and for which he sees a probable quick sale, but at an entirely satisfactory price. The further argument is made that collusion between the auctioneer and certain classes of dealers to advance prices at the auction results in tools being bought which are sold later to the user at less than the amount bid. It is said, too, that users often find that they have paid too much at auction for a machine or have bought what they did not really need, and dealers have then picked up these machines at their own price.

These arguments are undoubtedly supported by actual occurrences. They do not diminish, however, the force of what was brought out in the original article, that by being present and bidding at auctions the dealers help to develop the demand for these tools and are responsible in a large measure for the prices obtained. What was suggested was that the auctioneers, who guarantee to realize a certain sum upon a lot of equipment, would not continue long in the business if the dealers by staying away from such sales eliminated the real nucleus of the buying strength.

The Steel Corporation and Labor

Report of the Committee Appointed to Investigate Hours of Work and the Charge That Workmen Are Under Strain

At the annual meeting of the stockholders of the United States Steel Corporation, held at Hoboken, N. J., Monday, April 15, the committee appointed some months ago by Chairman E. H. Gary to investigate the condition of workmen in the employ of the subsidiary companies made its report. It was composed of Stuyvesant Fish, DeWitt C. Cuyler and Chas. L. Taylor, of New York; Chas. J. Painter, of Pittsburgh, and Darius Miller, of Chicago.

The Seven-Day Week and Twelve-Hour Day

Stuyvesant Fish as chairman presented the report, which took up the labor problem under four heads—the "seven-day week and long turn," the "twelve-hour day," the "speeding of the workman," and the "repression of the men." Referring to the seven-day week the committee says:

> Whether viewed from a physical, social or moral point of view we believe the seven-day week is detrimental to those engaged in it. While not wishing to imply that the method adopted by any individual official, or any combination of two or three methods, would be the best to meet the requirements in all mills, we are strongly of the opinion that, no matter what alleged difficulties of operation seem to hinder the abandonment of the seven-day week, they must be met.
>
> Closely allied with the question of the seven-day week is that of the excessive hours of labor involved in a continuous process, caused by the changing of the working shifts from day turns to night turns and vice versa. An examination of the time sheets of many of the mills shows that this practice has been entirely abolished in many of the departments and not in others. We recognize that at rare intervals there may come emergencies and unusual conditions that would make absolute enforcement of any exact schedule of work hours impracticable, a fact equally true in any field of industry and commerce. Our investigation, however, leads us to believe that it is feasible and practicable to eliminate the long turn formerly followed in changing of shifts in continuous process work, and that it should be done; further that conscientious efforts should be made by all to reduce to a positive minimum any undue length in work hours that emergencies and unforeseen conditions may sometimes demand.

In considering the 12-hour day the committee examined the records of 175,715 men. Of this number it found that 45,248, or 25¾ per cent., at present are working 12 hours per day. "The actual physical labor involved in many of the positions is today much less than in former years," the committee reported, "this being especially true of the open-hearth and blast furnaces, where the intermittent character of the work is such that there is less call for actual expenditure of physical energy than in many of the 8 and 10-hour positions. Notwithstanding this fact, we are of the opinion that a 12-hour day of labor, followed continuously by any group of men for any considerable number of years, means a decrease of the efficiency and lessening of the virility of such men."

The recommendation made by the committee in regard to the 12-hour day follows:

> That steps should be taken now that shall have for their purpose and end a reasonable and just arrangement to all concerned of the problem involved in this question—that of reducing the long hours of labor—we would respectfully recommend to the intelligent and thoughtful consideration of the proper officers of the corporation.

No High Pressure—The Question of Unions

Of speeding up of workmen the committee does not find evidence. There is no abuse of the bonus system or of the piece rate method. The committee rather praises these as means of creating esprit de corps.

The committee is in doubt as to what is meant by "the charge of repression of the men," as raised by Mr. Cabot, the complaining stockholder, and by Mr. John A. Fitch, whose report Mr. Cabot sent to the stockholders. It says:

> As a committee of stockholders we do not believe the final solution of the problems involved in this question has been reached. We do believe the present methods are preferable to the old for all concerned, and that the Steel Corporation, in view of the practices often pursued by labor organizations in steel mills in past years, is justified in the position it has taken.
>
> That the method of employment of to-day must prove to be the best for the future is a question on which there may well be a difference of opinion. The interests of society and the community at large will not best be served by that type of mind, whether it be employer or employee, which bases action on the assumption that might makes right. On the contrary, the adjustment of the relations between employer and employee is a task for men of sound minds, reciprocal natures, broad sympathies and courage, men who believe that the future may be made better than the present. May it not be reasonably hoped that such men, whether they be officials or wage earners, may more and more be found working together to bring forward the day when employer and employee shall enter into a common administration of industrial interests?

Chairman Gary's Statement

The following statement was submitted by Chairman E. H. Gary:

> A circular letter which was sent out by us at the request of Mr. Cabot to 15,000 stockholders, to which was attached a copy of Mr. Cabot's article, requested the stockholders to express their opinions to the Chairman of the Corporation concerning the resolution. Letters have been received from about 90 stockholders, but as we have received proxies from a very large percentage we can draw our own conclusion as to their general opinion of our management. These letters which we have received we have had printed for circulation.
>
> A careful analysis of the replies shows that 54 per cent., representing 6331 preferred shares and 2073 common, either expressed approval of the management of the corporation and what it has

done to improve the trade conditions, or stated their desire to leave the matter entirely to the management. About 13 2-3 per cent, representing 1184 preferred and 1075 common shares, indicate that they have no expression whatever to give. About 5.4 per cent, representing 330 preferred and 125 common shares, wish to see the continuation of the corporation's management of labor conditions; 22 per cent, for various reasons, would like to see a reduction of the hours of labor. A small percentage desire a reduction in the hours of labor, even at the expense of dividends. The stockholders who express a desire for a reduction in the hours of labor are generally women and clergymen.

Mr. Cabot made an effort to get before the meeting a resolution for a further investigation of the labor matter, but Mr. Fish took the floor against it. He said the committee had found conditions quite different from those alleged in the articles which condemned present practices. He asked Mr. Cabot not to involve the corporation in further expense by insisting upon another investigation. The resolution was finally withdrawn.

The Central Foundry Company's Report

The Central Foundry Company, whose main office is at 90 West street, New York, reports gross business for the eight months ended December 31, 1911, at $1,867,920 and net profits at $124,888. President Waddill Catchings, in his remarks to stockholders, after stating that there was no interruption in operations at the time the receivership was terminated last year, says:

"The principal business of the company has been the manufacture and sale of cast iron soil pipe, which is made at all six plants. The company also makes a number of specialties as well as 'universal' pipe in which the volume of business is large, though not as voluminous as that in soil pipe.

"We are at present testing further what we have regarded as our most valuable ore property, that at Friedman. With this ore and the coke we are now making, together with the pyrites nodules produced at Holt, we should be in a position to make pig iron at low cost.

"During the past year the company has not been able to receive the ultimate advantages of moneys raised in connection with reorganization for the purpose of improving manufacturing methods and costs. Large improvements have been under way for some time, but the results of these investments will not be felt until the latter part of 1912."

Government Fails to Indict Steel Officials

The Federal Grand Jury which sat in New York City for seven weeks taking testimony under the direction of the Department of Justice in an endeavor to indict certain officers of the United States Steel Corporation adjourned its sittings without finding evidence of guilt in connection with any of the matters under consideration. This grand jury particularly investigated the destruction of a number of letters which had been produced in the investigation of the so-called wire trade pools in the summer of 1911. The Government in its suit against the Steel Corporation called attention to the burning of these letters by applying for an injunction to restrain officers of the United States Steel Corporation and its subsidiaries from destroying any books or papers that might be required in the suit. A temporary restraining order was granted and the question of making it permanent is soon to be argued.

Inquiry at the Department of Justice at Washington in the past week brought out the admission that the Government had failed to find any one guilty of violation of law in connection with this matter. In its application for an injunction, the Government had thrown out the innuendo that certain officers of the Steel Corporation and its subsidiaries "had not yet been indicted." Such an insinuation of guilt in advance of any inquiry is not common in Government prosecutions, but it may be said that it is not the only unusual feature of anti-trust prosecutions. The point will not be missed, moreover, that the paramount aim seems to have been to indict some person or persons on a criminal charge rather than to have an enlightening judicial determination of the mooted questions connected with the application of the Sherman act to large business.

Cincinnati Business Men Honor Mr. Schwab

Charles M. Schwab, president of the Bethlehem Steel Corporation, was entertained at a banquet on the evening of April 10 at the Business Men's Club, Cincinnati, Ohio. The banquet was given jointly by the Business Men's and Manufacturers' clubs of Cincinnati and was arranged by W. F. Robertson, president of the W. F. Robertson Steel & Iron Company, Cincinnati. Nearly 300 were present, including many from outside the city.

Chairman W. F. Robertson introduced Mr. Schwab, who spoke in part as follows:

"There has been a great tendency on the part of legislation to break up and retard the development of big business. I want to point out to you what I believe is the natural course in the development of great enterprises. Take the steel industry as an example. At one time a man was content to own a single mill for the manufacture of but one product in the industry. Experience soon taught him that to own several mills and manufacture all the products was more economical, because he produced better results at a cheaper cost, and thus the business grew larger and larger. This developed into the acquirement of mines and the building of railroads. Following this came the erection of mills in different parts of the country, thereby effecting enormous saving in freight rates.

"No legislation can stand before the development of a great economic industry. I do not say that the great industries have been built up without attendant evils that should be corrected. This popular agitation for the destruction of big business is going forward on a wave that must overtop and right itself."

Mr. Schwab then took up the subject of profit sharing with employees, explaining an existing plan in force at the Bethlehem Steel Company. He also paid his respects to trade unionism, saying that he could never be in favor of unions as existing today, whereby an efficient man was held down to the base of the poorest workman.

A touch of sentiment, and entirely unlooked for by the guest of honor, came when Chairman W. F. Robertson read a letter from Mr. Schwab's parents expressing regret that they were unable to attend the banquet.

Other speakers of the evening included Alfred Bettman, Mayor Henry T. Hunt, C. B. Braunstein, J. G. Schmidlapp, W. P. Rodgers and D. B. Meacham. Mr. Meacham, head of the Cincinnati house of Rogers, Brown & Co., made a very interesting address on the growth of the iron business.

California's Electric Iron Works

H. H. Noble, president of the Noble Electric Steel Company, is reported in the San Francisco Chronicle as stating that the new electric furnace at Heroult, Cal., was succeeding beyond his expectations and that after a little further test the company would proceed to install three more furnaces and prepare to engage in smelting on a big scale. According to Mr. Noble, the samples of pig iron which he had received from the furnace were the finest ever turned out by any smelter in America, and he is enthusiastic about the future of the iron industry on the Pacific coast. He continued: "There is no limit to the extent of the industrial activity which the successful operation of our smelter will create in this State and all over the coast, and I believe that we are now in a position to say that the furnace is a success. We have had a long, hard struggle, because we have been experimenting with the only electric smelter in the country and we have had to learn our own lessons, for there has been no one who could give us the benefit of experience in this line."

Correction.—The announcement made in *The Iron Age* of April 11 regarding the incorporation of the business of Hendricks Brothers, 49 Cliff street, New York, contained an exceedingly annoying error. The secretary and treasurer of the new corporation is E. J. Keane. A typographical error caused Mr. Keane's name to be printed "Geane."

A meeting of the Association of American Steel Manufacturers will be held in the Marlborough-Blenheim hotel, Atlantic City, N. J., on Saturday, April 20.

The Iron and Metal Markets

Heavy Buying of Steel Bars

Agricultural Contracts for 1912

The Pig Iron Market Active in Chicago, Buffalo and Eastern Districts

The week's developments in pig iron and in finished steel have been highly encouraging. Of most importance from a tonnage standpoint was the heavy buying of steel bars by agricultural machinery interests. Leading manufacturers in this line contracted for their bars for the remainder of the year, as high as 1.15c. Pittsburgh being paid for such deliveries. Probably 200,000 tons was taken in these contracts.

Not only has pig iron been bought on a liberal scale, but what is happening in that market is of growing significance, since at last pig iron prices are on a level giving some profit. A prostrated pig iron market was a poor foundation on which to advance finished material. That condition in the basic industry no longer exists.

The pig iron buying has included basic, malleable and foundry irons and has taken in nearly all districts. At Chicago sales have amounted to 70,000 tons. Buffalo furnaces have sold quite heavily, a considerable part going to Canada. Important foundries in the East and in the Central West have covered for the third quarter and not a few for the second half of the year. Northern furnaces have not followed the Southern advance, but even so some of the former have secured 75 cents to $1 advance over the cost line sales made in the past six months.

Southern furnaces are almost a unit in asking for $11 for No. 2 for the second half, and prompt Southern iron has been selling at $10.75 in some markets, though $10.50 iron has not disappeared. In addition to the 60,000 tons of Southern iron bought by the leading pipe interest three weeks ago, it has since taken about 40,000 tons.

In Northern Ohio two sales of basic iron at $12.50 Cleveland furnace—one of 21,000 tons and the other 15,000 tons for shipment to Ohio river points—indicate that competition for large lots is still keen. Eastern buyers of basic are in the market, and it is expected that the Steel Corporation will make a further purchase of Bessemer or basic in the Pittsburgh district. A 5000-ton and a 10,000-ton sale of basic at Pittsburgh for delivery through the year were made at about $13 Valley furnace.

Michigan charcoal iron producers have been active sellers, one interest having closed its largest fortnight's business since April 1. The use of charcoal iron for car wheels and for special castings is growing.

Rail sales include 50,000 tons for maintenance work, to the Harriman lines, of which the Colorado mill took 21,000 tons, the remainder going to the Steel Corporation for rolling in the Birmingham and Chicago districts. The Chicago Great Western bought 6000 tons and the Northern Pacific placed 5000 tons each with the Pennsylvania and Cambria steel companies. The Pere Marquette is in the market for 14,000 tons. A contract with a trunk line for 30,000 tons, in addition to its first order, is being closed this week. The Harriman lines are yet to buy rails for new construction.

The leading sheet interest announces an advance to 1.95c. for No. 28 black and to 3c. for galvanized. The market is firmer, though it has not yet been established at this level.

Current contracts for bars, apart from the agricultural sales noted above, are for delivery up to July 1. The Carnegie Steel Company has given notice of an advance in bars to 1.20c. Pittsburgh on April 20, and in structural steel and plates to 1.25c. on the same date. The Republic Iron & Steel Company advanced bars to 1.20c. April 16 and other sellers appear to be taking a like stand. So much bar business is on the books that the amount on which 1.20c. will be paid at any early date will be relatively small. Jobbers' sales from low priced stocks are also a factor.

The wrought pipe trade has made some strides forward, though this is not said of prices. A contract just taken at Pittsburgh is for 158 miles of 8-in. and 30 miles of 6-in. oil pipe for the California Pipe Line Company.

The Harriman lines and the Santa Fé are both expected to buy considerably more cars than are called for in their respective inquiries for 9400 and 3700. In all, 15,000 to 20,000 cars are pending. The Canadian Pacific placed 3000 in Canada and 2000 with each of two Pennsylvania companies.

The Standard Oil Company has just bought 60,000 boxes of Welsh tin plate for shipment to the far East at 14s. 3d.—its first important purchase of foreign plates in months.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics.

At date, one week, one month and one year previous.

	Apr. 17, 1912.	Apr. 10, 1912.	Mar. 20, 1912.	Apr. 19, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	$15.00	$15.00	$15.00	$15.50
Foundry No. 2, Valley furnace	13.25	13.25	13.25	13.75
Foundry No. 2, Southern, Cincinnati	13.75	13.75	13.50	14.25
Foundry No. 2, Birmingham, Ala.	10.50	10.50	10.25	11.00
Foundry No. 2, at furnace, Chicago*	14.00	14.00	14.00	15.00
Basic, delivered, eastern Pa.	15.00	15.00	14.50	15.25
Basic, Valley furnace	13.00	13.00	13.00	13.75
Bessemer, Pittsburgh	15.15	15.15	15.15	15.90
Malleable Bessemer, Chicago	14.00	14.00	14.00	15.00
Gray forge, Pittsburgh	13.65	13.65	13.40	14.40
Lake Superior charcoal, Chicago	15.75	15.75	15.75	17.50
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh	20.00	20.00	19.50	23.00
Open-hearth billets, Pittsburgh	20.00	20.00	19.00	23.00
Forging billets, Pittsburgh	27.00	27.00	26.50	28.00
Open hearth billets, Philadelphia	22.40	22.40	22.40	25.40
Wire rods, Pittsburgh	25.00	25.00	25.00	29.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	15.25	15.25	15.00	14.50
Iron rails, Philadelphia	15.50	15.50	15.50	17.50
Car wheels, Chicago	**13.50**	13.00	13.00	13.25
Car wheels, Philadelphia	13.00	13.00	11.75	13.25
Heavy steel scrap, Pittsburgh	13.00	13.00	13.00	12.75
Heavy steel scrap, Chicago	**11.50**	11.00	10.75	11.50
Heavy steel scrap, Philadelphia	**13.25**	12.75	11.75	13.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel.	Apr. 17, 1912.	Apr. 10, 1912.	Mar. 20, 1912.	Apr. 19, 1911.
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.27½	1.27½	1.22½	1.35
Iron bars, Pittsburgh	1.25	1.25	1.25	1.35
Iron bars, Chicago	1.15	1.15	1.15	1.25
Steel bars, Pittsburgh	1.15	1.15	1.10	1.40
Steel bars, tidewater, New York	1.31	1.31	1.26	1.56
Tank plates, Pittsburgh	1.20	1.20	1.15	1.40
Tank plates, tidewater, New York	1.31	1.31	1.26	1.56
Beams, Pittsburgh	1.20	1.20	1.15	1.40
Beams, tidewater, New York	1.31	1.31	1.26	1.56
Angles, Pittsburgh	1.20	1.20	1.15	1.40
Angles, tidewater, New York	1.31	1.31	1.26	1.56
Skelp, grooved steel, Pittsburgh	**1.12½**	1.10	1.10	1.30
Skelp, sheared steel, Pittsburgh	**1.17½**	1.15	1.15	1.35
Sheets, Nails and Wire,				
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	1.85	1.85	1.80	2.20
Wire nails, Pittsburgh	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh	1.55	1.55	1.55	1.70
Fence wire, ann'led, 0 to 9, P'gh.	1.40	1.40	1.40	1.60
Barb wire, galv., Pittsburgh	1.90	1.90	1.90	2.10
Coke, Connellsville,				
Per Net Ton, at Oven:				
Furnace coke, prompt shipment	**$2.60**	$2.25	$2.25	$1.60
Furnace coke, future delivery	2.25	2.25	2.25	1.75
Foundry coke, prompt shipment	2.75	2.75	2.75	2.00
Foundry coke, future delivery	2.50	2.75	2.50	2.25
Metals, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	16.00	16.00	14.75	12.37½
Electrolytic copper, New York	**16.00**	15.87½	14.62½	12.12½
Spelter, St. Louis	**6.80**	6.60	6.90	5.30
Spelter, New York	**6.95**	6.75	7.05	5.50
Lead, St. Louis	4.12½	4.12½	4.05	4.30
Lead, New York	4.20	4.20	4.10	4.45
Tin, New York	43.40	43.40	42.15	41.70
Antimony, Hallett, New York	7.75	7.75	7.37½	8.75
Tin plate, 100-lb. box, New York	$3.54	$3.54	$3.54	$3.94

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.20c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, $1.40; galvanized, $1.70. Carload lots to retailers, annealed, $1.50; galvanized, $1.80. Galvanized barb wire, to jobbers, $1.90; painted, $1.60. Wire nails, to jobbers, $1.60.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, per 100 Lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.20c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.25 to 1.30
H-beams over 18 in.	1.25 to 1.30
Angles over 6 in.	1.25 to 1.30
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909	1.25 to 1.30
Tees, 3 in. and up	1.25 to 1.30
Zees, 3 in. and up	1.20 to 1.25
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909	1.25 to 1.30
Deck beams and bulb angles	1.50 to 1.55
Hand rail tees	2.05 to 2.20
Checkered and corrugated plates	2.05 to 2.20

Sheets.—Makers' price for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.20 to 1.25
Nos. 9 and 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.40 to 1.45
Nos. 15 and 16	1.50 to 1.55

Box Annealed Sheets, Cold Rolled.

	One-Pass.	Three Pass.
Nos. 10 to 12	1.50 to 1.55	.....
Nos. 13 and 14	1.55 to 1.60	.....
Nos. 15 and 16	1.60 to 1.65	1.70 to 1.75
Nos. 17 to 21	1.65 to 1.70	1.75 to 1.80
Nos. 22, 23 and 24	1.70 to 1.75	1.80 to 1.85
Nos. 25 and 26	1.75 to 1.80	1.85 to 1.90
No. 27	1.80 to 1.85	1.90 to 1.95
No. 28	1.85 to 1.90	1.95 to 2.00
No. 29	1.90 to 1.95	2.00 to 2.05
No. 30	2.00 to 2.05	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	1.85 to 1.90
Nos. 12, 13 and 14	1.95 to 2.00
Nos. 15 and 16	2.10 to 2.15
Nos. 17 to 21	2.25 to 2.30
Nos. 22, 23 and 24	2.35 to 2.40
Nos. 25 and 26	2.55 to 2.60
No. 27	2.70 to 2.75
No. 28	2.85 to 2.90
No. 29	2.95 to 3.00
No. 30	3.15 to 3.20

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations.

Corrugated Roofing Sheets per Square.

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	....	$2.20	23	$2.25	$3.35
28	$1.30	2.45	22	2.40	3.50
27	1.40	2.50	21	2.60	3.85
26	1.50	2.55	20	2.85	4.15
25	1.70	2.90	18	3.80	5.40
24	1.95	3.00	16	4.55	6.25

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911; galvanized iron pipe, from March 1, 1912:

Butt Weld.

	Steel		Iron	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ in.	74	54	68	49
⅜ in.	75	65	69	53
½ in.	78	68	72	59
¾ to 1½ in.	81	72	75	64
2 to 3 in.	82	75	76	65
Lap Weld.				
1¼ and 1½ in.	..	..	68	61
2 in.	79	72	72	63
2½ to 4 in.	81	74	74	66
4½ to 6 in.	80	72	73	65
7 to 12 in.	78	68	71	61
13 to 15 in.	55	..	47	..
Butt Weld, extra strong, plain ends, card weight.				
⅛, ¼, ⅜ in.	70	60	65	55
½ in.	75	69	70	63
¾ to 1½ in.	79	73	74	65
2 to 3 in.	80	74	75	66
Lap Weld, extra strong, plain ends, card weight.				
1½ in.	..	..	66	60
2 in.	76	70	71	63
2½ to 4 in.	78	72	73	66
4½ to 6 in.	77	71	72	65
7 to 8 in.	70	60	65	55
9 to 12 in.	65	55	60	50

Butt Weld, double extra strong, plain ends, card weight.				
⅛ in.	65	59	60	52
¼ to 1½ in.	68	62	63	55
2 to 3 in.	70	64	65	57
Lap Weld, double extra strong, plain ends, card weight.				
2 in.	66	60	61	52
2¼ to 4 in.	68	62	63	57
4½ to 6 in.	67	61	62	56
7 to 8 in.	69	50	55	45

Plugged and Reamed.

2, 2½ to 4 in.....Lap Weld
1 to 1½, 2 to 3 in.Butt Weld

Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.		*Standard Charcoal Iron.*	
1¼ to 2¼ in.	65	1½ in.	48
2½ in.	67½	1¾ to 2½ in.	50
2¾ to 3¼ in.	72½	2¾ in.	55
3½ to 4 in.	75	2¾ to 5 in.	60
5 to 6 in.	67½	Locomotive and steamship special grades bring higher prices.	
7 to 13 in.	65		

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

Pittsburgh

PITTSBURGH, PA., April 17, 1912.

Owing to the higher prices asked on nearly all kinds of finished iron and steel, the amount of new business now being placed is only fairly large. Local steel companies are adhering firmly to their higher prices and one is quoting steel bars, plates and shapes for Chicago delivery based on 1.15c. for steel bars and 1.20c. for plates and shapes Pittsburgh, plus the full rate to Chicago, 18c. per 100 lb. Most of them are booked up practically solid on finished material for second quarter and have a good deal sold into third quarter. Prices of pig iron are firm and there is a fair amount of new inquiry. Large sales of sheet bars in the Youngstown district are reported to have been made and at higher prices than were ruling a month or two ago. As yet, little new business on sheets has been placed at the higher prices, consumers being pretty well covered for some time ahead. Relatively high prices are still being paid for prompt deliveries of furnace coke, but the supply is better and it is probable that top prices have been reached. A moderate amount of scrap is moving from dealers to consumers and prices are strong. The whole situation looks good over the next quarter at least, and there are indications that higher prices on steel bars, plates and shapes and one or two other lines of finished material will soon be announced. The output of pig iron, steel and finished material in this district is heavier than ever before, and the present rate of production promises to keep up through the second quarter. Only four blast furnaces in the district are idle, and two of these are likely to start this month.

Pig Iron.—New inquiry has been rather quiet, as most consumers have bought heavily and are pretty well covered through the second quarter. A large steel casting interest is credited with having bought about 10,000 tons of basic iron for last half delivery on the basis of $13, Valley furnace. The Pittsburgh Malleable Iron Company, affiliated with the Pressed Steel Car Company, has closed for about 1000 tons of malleable Bessemer for second quarter at about $13.25, Valley furnace. The Republic Iron & Steel Company is now quoting $11, Birmingham, on No. 2 foundry iron for third quarter and $11.50 for fourth quarter. The Carnegie Steel Company blew in last week its No. 2 Isabella furnace on basic iron, No. 1 now being on basic and Nos. 2 and 3 on Bessemer. This company is now operating 51 out of 59 blast furnaces, one Columbus stack having had an accident which put it out for repairs. Sales of 500 to 600 tons No. 2 foundry iron for second quarter delivery are reported on the basis of $13.25, Valley furnace, and a sale of 500 tons of forge iron at $12.75, Valley furnace. We quote: Bessemer, $14.25; basic, $13 to $13.25; malleable Bessemer, $13 to $13.25; No. 2 foundry, $13.25, and gray forge, $12.75, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

(*By Telegraph.*) The Colonial Steel Company has bought 5000 tons of basic iron for delivery over the remainder of the year at equal to about $13, Valley furnace. The iron does not come from the Valley but from a nearby furnace which has a freight rate of 45c. to Colona, Pa., where the plant of the Colonial Company is located. A local steel casting company has bought 600 tons of standard Bessemer pig iron for prompt delivery at a little under $14.25, Valley furnace.

Steel Billets and Sheet Bars.—The local market on steel is very firm and the Youngstown mills are now quoting higher prices. Signs are multiplying that before long there will be a shortage in the supply of steel. Sales of sheet bars aggregating 8000 to 10,000 tons on the basis of about $20.50, Youngstown, are reported. Shipments of billets and sheet bars by the mills this month promise to be fully as heavy as in March. We quote f.o.b. Pittsburgh, Bessemer and open-hearth billets, $20; Bessemer and open-hearth sheet bars, $21; axle billets, $25; forging billets for general forging purposes, $28. Prices f.o.b. Youngstown are: Bessemer and open-hearth billets, $19.50 to $20; Bessemer and open-hearth sheet bars, $20.50 to $21.

Ferromanganese.—Prices of English 80 per cent. have been advanced $2.50 per ton, and importers are now quoting on the basis of $43.50, Baltimore. A sale of about 50 tons to a Sharon consumer was made last week at $41, Baltimore, but as high as $46 is now offered for prompt, which is very scarce. The freight rate for delivery from Baltimore to the Pittsburgh district being $1.95 a ton.

Ferrosilicon.—Sales of several carloads, or about 50 tons, for prompt shipment, have been made at the full price of $70, delivered. Nearly all consumers are covered, new inquiry being light and only for small lots. We quote 50 per cent. in lots up to 100 tons at $70; over 100 tons to 600 tons, $69, and over 600 tons, $68, Pittsburgh. The lower grades are ruling at about $20 for 10 per cent.; $21 for 11 per cent.; $22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio.

Wire Rods.—New inquiry is very light. In some cases shipments on contracts have been held up, and it is stated that these consumers have been offered rods at slightly lower prices than are named in their contracts. We quote Bessemer, open hearth and chain rods at $25, Pittsburgh.

Muck Bar.—New demand is quiet. We quote best grades of muck bar, made from all pig iron, at $28.50 to $29, delivered at buyer's mill in the Pittsburgh district.

Skelp.—A sale of 1000 tons of narrow grooved steel skelp for April and May delivery is reported on the basis of 1.12½c., f.o.b. Pittsburgh. Prices are firm and slightly higher. We quote grooved steel skelp at 1.12½c. to 1.15c.; sheared steel skelp, 1.17½c. to 1.20c.; grooved iron skelp, 1.45c. to 1.50c., and sheared iron skelp, 1.60c. to 1.65c., all for delivery at buyer's mill in the Pittsburgh district.

Steel Rails.—No orders of moment for standard sections have been placed with the local mill recently, and new business in light rails is not as large as it was some time ago, due to the higher prices now quoted. New orders and specifications for light rails received by the Carnegie Steel Company in the past week amounted to about 2000 tons. We quote splice bars at 1.50c. per lb. and rails as follows: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.29½c.; 12 and 14-lb., 1.20c.; 16 and 20-lb., 1.15c.; 25, 30, 35, 40 and 45-lb., 1.10c., in carload lots, f.o.b. Pittsburgh.

Structural Material.—The McClintic-Marshall Construction Company has taken about 300 tons for car shops for the Harlan & Hollingsworth Corporation, Wilmington, Del., and about 325 tons for new buildings for the Struthers-Wells Company, Warren, Pa. Plans have been made for an addition to the Fort Pitt Hotel in this city, which will take about 500 tons. The two local mills rolling structural steel are adhering firmly to 1.20c., and for small lots are said to be quoting 1.25c.

Plates.—The Atlantic Coast Line has placed 1900 wooden box cars with steel underframes with the Pressed Steel Car Company and is reported to be in the market for 2000 more. The Pennsylvania Railroad has ordered 2700 passenger cars from the Pressed Steel Car Company and 20 from the Standard Steel Car Company. The city of Pittsburgh is buying 300 tons of steel plates to be rolled into pipe and the order will likely go to the Carnegie Steel Company. Local plate mills are filled up with work, the Carnegie Steel Company not promising deliveries inside of six weeks, while the Cambria Steel Company will not accept orders for sheared plates for delivery inside of four weeks. With orders already booked and business in sight, they are assured of full operation up to July 1 at least. We quote ¼ in. and heavier plates firm at 1.20c., Pittsburgh.

Sheets.—Under date of April 11, the American Sheet & Tin Plate Company sent out new price lists on sheets based on 1.95c. for No. 28 black and 3c. for No. 28 galvanized. It is practically sold up on sheets through the second quarter and is now accepting business for delivery in third quarter at the prices named. The independent sheet mills are also firmer in their ideas as to prices, and 1.85c. on No. 28 black is now absolute minimum of the market, while on nearly all new business 1.90c. is being obtained. Specifications on contracts continue very heavy, and shipments this month promise to be fully as large as in March, which was a record breaker. We quote No. 28 black at 1.90c. to 1.95c. and No. 28 galvanized at 2.90c. to 3c. f.o.b., Pittsburgh.

Tin Plate.—In view of the advance in prices of sheets made by the leading interest, some in the trade believe that an advance in prices of tin plate in the near future is not unlikely. Practically all the mills are operating close to 100 per cent. of capacity, very heavy specifications being received from consumers. Manufacturers confidently look for the heaviest trade in tin plate this summer that has ever been known. New demand is quiet, as consumers are covered, and on the inquiries for small lots that are coming out from $3.30 to $3.40 per base box 14 x 20 coke plates is quoted.

Iron and Steel Bars.—Prices on steel bars are very firm, and the Carnegie Steel Company announces that on April 20 it will advance its price to 1.20c, Pittsburgh. The advance notice is given in order to allow customers to place their contracts at 1.15c., on which basis the company will receive orders up to the date named. The Jones & Laughlin Steel Company is quoting for delivery in the Chicago district at 1.15c., Pittsburgh, plus the full freight, which makes 1.33c., Chicago. The new demand is fairly heavy, while specifications against contracts are coming in very freely. There is a fair demand for iron bars and mills report that good-sized specifications are being received from car builders. We quote steel bars at 1.15c., which is minimum of the market, and common iron bars at 1.25c., maker's mill, Pittsburgh. Effective Tuesday, April 16, the Republic Iron & Steel Company advanced its price on steel bars to 1.20c. minimum, f.o.b., Pittsburgh, and states that it will not shade this price.

Hoops and Bands.—Mills report a fairly active demand for hoops and bands and state that specifications against contracts are coming in better than for some months. We quote steel bands firm at 1.15c., with extras as per the steel bar card, and hoops at 1.25c. to 1.30c., f.o.b., Pittsburgh.

Rivets.—The new demand and specifications against contracts have grown heavier and makers are booking a good deal of new business. We quote structural rivets firm at 1.45c to 1.50c. and boiler rivets at 1.55c. to 1.60c., f.o.b., Pittsburgh.

Shafting.—In spite of a much stronger demand for shafting and also much heavier specifications against contracts, prices have not as yet shown any advance, but the tone of the market is stronger and makers believe they will be able to get better figures in the near future. We continue to quote cold rolled shafting at 67 per cent. off in carload and larger lots and 62 per cent. in small lots delivered in base territory.

Merchant Steel.—The new demand is heavier and specifications against contracts are also coming in more freely. Shipments this month promise to be larger than in any one month for a long time. Prices are firm and we quote: Iron finished tire, 1½ x ⅜-in. and larger, 1.15c., base; planished tire, ⅛-in. and larger, 1.35c.; channel tire, ¾, ⅞ and 1-in., 1.65c.; toe calk, 1.70c., base; flat sleigh shoe, 1.25c.; concave or convex, 1.55c.; cutter shoe tapered or bent, 2.15c.; spring steel, 1.75c.; machinery steel, smooth finish, 1.50c., all f.o.b. at mill.

Spelter.—The market has been quiet and prices are slightly easier. We quote prime grades of Western at 6.72½c., Pittsburgh.

Railroad Spikes.—Prices are firmer. Railroads are specifying quite liberally against contracts. We quote railroad spikes in base sizes at $1.40 per 100 lb., f.o.b., Pittsburgh.

Wire Products.—The new demand for wire and wire nails is showing betterment as the season advances, and specifications against contracts are also coming in more freely. While the mills are reported as adhering firmly to $1.60 for wire nails, some of the jobbers who have nails in stock bought at lower prices are slightly shading this price. The spring trade in wire and wire nails this season will not be as heavy as anticipated and the new demand in May is likely to show a falling off. We quote wire nails at $1.60; cut nails, $1.50; galvanized barb wire, $1.90; painted, $1.60; annealed fence wire, $1.40, and galvanized fence wire, $1.70, f.o.b., Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—The California Pipe Line Company has placed an order with the National Tube Company for 158 miles of 8-in. line pipe and 30 miles of 6-in. The Medina Natural Gas Company has placed an order for 12 miles of 12-in. line pipe with Spang, Chalfant & Co., Inc. Several other large gas and oil lines are in the market and are likely to be placed in the near future. A local mill has also taken 12 to 15 miles of 4-in. for delivery in Canada. The new demand for merchant pipe is showing some increase and local mills report that orders booked so far this year are considerably larger than in the same period last year. Regular discounts on iron and steel pipe are being maintained.

Boiler Tubes.—Railroads are specifying quite freely against contracts for locomotive tubes placed sometime ago but no large new business is in the market. The new demand for merchant tubes is only fair and prices continue to rule very low.

Iron and Steel Scrap.—The local market is decidedly firm. Consumers are willing to contract for material at to-day's prices but dealers are not anxious to sell short, believing that the whole line is about due for an advance. Most local dealers are now holding heavy steel scrap at $13.25, with consumers bidding $13 and not getting much at that price. Sales of 2000 to 2500 tons of heavy steel scrap are reported in the past week at $13 to $13.10 delivered. We also note a sale of 300 tons of cast iron borings at $9.50 delivered. Dealers are quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$13.00 to $13.25
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap f.o.b. consumers' mill, Pittsburgh district	11.25 to 11.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin Pa.	13.25 to 13.50
No. 1 railroad malleable stock	11.75 to 12.00
Grate bars	9.50 to 9.75
Low phosphorus melting stock	15.00
Iron car axles	21.00 to 21.50
Steel car axles	15.50 to 15.75
Locomotive axle	22.00 to 22.50
No. 1 busheling scrap	11.50 to 11.75
No. 2 busheling scrap	8.00 to 8.25
Old car wheels	13.00 to 13.25
*Cast iron borings	9.50 to 9.75
*Machine shop turnings	9.75 to 10.00
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Stove plate	9.50 to 9.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Coke.—The supply of furnace and foundry coke is getting larger and it is believed that top prices have about been reached. Sales of 8000 to 10,000 tons of standard grade furnace coke for prompt shipment have been made in the past week at prices ruling from $2.60 to $2.65 per net ton at oven. Spot 72-hour foundry coke is held at $2.75 to $2.90 at oven. Several large inquiries for furnace coke for shipment over the last half are in the market, but so far none of this business has been closed. The output in the Upper and Lower Connellsville regions last week was 415,464 net tons, an increase over the previous week of about 2500 tons and the heaviest output in any one week in these two regions for several years. We quote standard grades of prompt furnace coke at $2.60 to $2.65 and best makes of 72-hour foundry coke at $2.75 to $2.90 per net ton at oven for spot.

Chicago

CHICAGO, ILL., April 16, 1912.

In practically every direction the local market exhibits a buying activity in increasing degree. The soundness of the price advances which have been made and are being made is attested by the stimulating influence they are having upon the situation. With respect to bars in particular, the announcement that an advance of $1 a ton from the present basis of 1.15c. Pittsburgh seems likely to result in much more than a mild form of interest on the part of implement manufacturers. Some tonnage has already been placed under contract. On shapes and plates Chicago delivered prices have practically disappeared and all of the leading mills in making quotations have reverted to the Pittsburgh basis of 1.20c. plus freight. Specifications and sales continue to be placed in increasing volume. Railroads are pushing their demands for rails and track

fastenings and the inquiry for cars is heavy. The pig iron market was featured by sales in this territory estimated to total in the neighborhood of 70,000 tons, with inquiries remaining unplaced aggregating nearly 20,000 tons additional. Prices for old material continue to advance notwithstanding the level of the Chicago market is higher than in any of the surrounding territory and despite the undoubted quantity of scrap about to be moved into consuming centers.

Pig Iron.—Purchases of Northern and Southern pig iron at Chicago, but not entirely for distribution in Chicago territory proper, totaled in the neighborhood of 70,000 tons in the past week. The leading radiator interest purchased between 30,000 and 40,000 tons. Implement interests of Moline completed their buying for the last half begun about two weeks ago, with total purchases aggregating 15,000 tons and consisting of 9000 tons of malleable Bessemer and 6000 tons of Southern foundry, the purchases being divided among several furnaces. A large steel foundry interest bought for its Alliance, Ohio, plant 10,000 tons and one of the leading carbuilders took 2000 tons of foundry iron. Inquiries from an Indiana plow company and a Wisconsin stove manufacturer for 1000 to 2000 tons for last half delivery are examples of pending inquiry which totals nearly 20,000 tons. A local inquiry for 2000 tons of basic noted two weeks ago has been placed with a local furnace. In view of the decidedly firm attitude of Southern furnaces, whose minimum quotation even for prompt shipment appears to be $10.75, Birmingham, with $11 asked for last half shipment, the irregularities and weakness of local irons are somewhat surprising. There is evidence that desirable orders can be placed on the basis of $14 f.o.b. furnace, although prices below $14, such as have been made within the past fortnight, seem less likely of being made. For the less desirable business quotations as high as $14.50 at the furnace are being made with a degree of firmness. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal	$15.75 to $16.50
Northern coke foundry No. 1	14.50 to 15.00
Northern coke foundry, No. 2	14.00 to 14.50
Northern coke foundry, No. 3	14.00 to 14.25
Northern Scotch, No. 1	16.00
Southern coke, No. 1 foundry and No. 1 soft	15.35 to 15.85
Southern coke, No. 2 foundry and No. 2 soft	15.10 to 15.35
Southern coke, No. 3	14.85 to 15.10
Southern coke, No. 4	14.35
Southern gray forge	13.85
Southern mottled	13.85
Malleable Bessemer	14.00
Standard Bessemer	16.75
Basic	14.75
Jackson County and Kentucky silvery, 6 per cent	16.40
Jackson County and Kentucky silvery, 8 per cent	17.40
Jackson County and Kentucky silvery, 10 per cent	18.40

Rails and Track Supplies.—Rail purchases by Western roads continue to mount upward. The Northern Pacific has awarded 5000 tons each to the Pennsylvania Steel Company and the Cambria Steel Company. The placing of the rail business of the Harriman lines is expected promptly. There is also an active specification on the part of the railroads for track fastenings. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.20c. to 1.25c.; 16 to 20 lb., 1.25c. to 1.30c.; 12 lb., 1.30c. to 1.35c.; 8 lb., 1.35c. to 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—It is estimated that inquiries are pending which will result in the purchase of nearly 50,000 cars. The more important of these include that for the Harriman lines for 8500 cars and of the Santa Fe for 3700. The general impression is that both systems will buy a considerably larger number than the inquiry calls for. Both the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul are building cars in their own shops, the latter about 2000 steel underframe box cars. Car orders in smaller lots from almost every railroad of importance aggregate a large total, and specifications providing for the structural shapes to cover continue in a steady stream to the mills. It is estimated that the principal local mill booked in the past week more than double its possible output. The buying of shapes for architectural purposes is in fairly good volume and emanates from an aggregate of small fabricating contracts. Contracts of this character noted the past week include 247 tons for the United States Yards and Transit Company, awarded to the Modern Steel Structural Company; 730 tons for the Crocker Estate Building at San Francisco to the American Bridge Company; 330 tons to Stupp Bros. Bridge & Iron Company for the Illinois Dredging & Construction Company. The Erie Railroad Company awarded the contract for 2300 tons of steel for a coal storage plant at Hammond, Ind. The increasing firmness of prices for plain material has brought about the abandonment of the Chicago delivered prices which have been in effect since the inception of the open market on steel products, and the prevailing quotations are now based on the Pittsburgh price of 1.20c. plus the freight. We quote Chicago delivery, mill shipment, for plain material 1.38c., and from store, 1.60c.

Plates.—Carbuilding, both in progress and in prospect, maintains the plate situation at the mills in a well filled condition. Prices show increasing firmness, and the minimum quotation is now 1.20c., Pittsburgh, with reports of an advance of $1 a ton above this price for the near future. We quote for Chicago delivery, mill shipment, 1.38c., and from store, 1.60c.

Sheets.—The local market on sheets hardly supports the advances of $2 a ton on black and galvanized announced from Pittsburgh as effective April 11. Local prices, while they are working in the direction of higher levels, may still be quoted as a week ago. The revision of differentials on flat galvanized sheets, in accordance with which No. 17 gauge is grouped with Nos. 18 to 21, and No. 22 gauge is grouped with No. 24, was immediately adopted. New business continues very satisfactory, and the strong position occupied by sheet bars evidences the requirements of the mills. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.08c. to 2.13c.; No. 28 galvanized, 3.08c. to 3.18c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.45c.

Bars.—The decided firmness of the steel bar market on the basis of 1.15c. Pittsburgh, and the expected advance to the basis of 1.20c. April 20, have brought to light what promises to be an active buying campaign. Implement manufacturers are beginning to skirmish in the interest of their next year's requirements and a small tonnage has already been placed at 1.15c. Bar mills are not lending particular encouragement to the movement. Bar iron likewise is being held more strongly and prices are generally 50c. a ton higher. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars, rolled from old rails, 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Old Material.—Prices here continue to advance notwithstanding comparison shows them to be on a noticeably higher level than the market in neighboring centers. To an extent this unusual situation has influenced a movement of scrap into Chicago from points which are usually an outlet for local material. The quantity of scrap which is yet to be moved in from outlying districts also adds to the apparent insecurity of present quotations. At the same time the limited quantities at present available in their relation to melters' demands continue to establish higher values. The offer of scrap by the Santa Fe system noted last week was watched with considerable interest in view of the large quantities of old material held by this railroad but no sales were made from the list. New offerings of railroad scrap include 200 tons by the New York Central Lines, 300 tons by the Chicago & Alton and about 14,000 tons by the Baltimore & Ohio. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	$15.25 to $15.75
Old steel rails, rerolling	12.75 to 13.25
Old steel rails, less than 3 ft.	11.75 to 12.25
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	13.50 to 14.00
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Steel axle turnings	9.50 to 10.00
Per Net Ton.	
Iron angles and splice bars	$13.75 to $14.25
Iron arch bars and transoms	14.50 to 15.00
Steel angle bars	11.00 to 11.50
Iron car axles	19.25 to 19.75
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	12.25 to 12.75
No. 2 railroad wrought	11.25 to 11.75
Steel knuckles and couplers	10.75 to 11.25
Steel springs	11.00 to 11.50
Locomotive tires, smooth	13.00 to 13.50
Machine shop turnings	7.25 to 7.75
Cast and mixed borings	6.50 to 7.00
No. 1 busheling	10.00 to 10.50
No. 2 busheling	7.25 to 7.75
No. 1 boilers, cut to sheets and rings	7.75 to 8.25
Boiler punchings	13.00 to 13.50
No. 1 cast scrap	12.00 to 12.50
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.00 to 10.50
Pipes and flues	9.00 to 9.50

Wire Products.—The improvement in sales of wire products thus far in April gives promise of a much better showing for the mills than was true of March. Prices are firm, with an indication of following the generally upward course of the market. We continue to quote as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78 to $1.83; galvanized, $2.08; polished staples, $1.83; galvanized, $2.13, all Chicago.

Cast Iron Pipe.—The placing of large orders for cast iron pipe continues to be less extensive than had been anticipated. The letting by the city of Milwaukee of 1500 tons is noted, the successful bidder being the United States Cast Iron Pipe & Foundry Company. This company also took small lots of pipe at Saginaw and Pontiac, Mich. At Bay City a small tonnage was divided between the Lynchburg Foundry Company and W. E. Clow & Co. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $27; 6 to 12-in., $25; 16-in. and up, $24.50, with $1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., April 16, 1912.

Notwithstanding the somewhat higher range of prices on most iron and steel products the volume of business has been well maintained. Sales of low grade foundry irons have been comparatively large, usually at higher prices. Steel making irons have also been more active. Plates and billets have been in good demand, but structural material and bars have been a shade quieter. Top of the market prices are being readily obtained for ordinary run of business. Coke is still in active demand, particularly prompt furnace grades, which continue scarce. Old material is strong. No. 1 heavy melting steel scrap has been sold as high as $13.50, delivered. Ferromanganese is now quoted at $43.50, seaboard, for second half shipment..

Iron Ore.—Recent sales of Lake ore to merchant furnaces in this district will probably not aggregate over 250,000 tons. A like tonnage is estimated to have been taken by several steel works furnaces, although some of this was not purchased in what might be considered as the open market. At least one consumer is understood to be still negotiating for a moderate quantity. The foreign ore market is practically at a standstill. The recently reported cancellation of some 30,000 tons of Swedish ore was readily absorbed on the other side. No Swedish ore is now being offered in this market. Importations during the week were confined to Cuban ore, of which 10,390 tons was bought in.

Pig Iron.—While the movement in the higher foundry grades continues on a rather narrow basis low grade iron has been more active. Sales of pipe making grades have been particularly good, with several consumers still in the market. One sale of 3000 tons and another of 1000 tons, the latter at $14.50, delivered, have been made to one Delaware River consumer, while smaller lots of off grade iron have also been moved. In Virginia cast iron pipe makers have bought an aggregate of 9000 tons of Virginia pipe iron, mostly at $12.50, furnace, although higher grades were taken at $12.75 and $13. There is a growing scarcity of both Northern and Virginia low grade iron. In the higher grades of eastern Pennsylvania foundry iron few sales in excess of 500 tons are reported, the majority of transactions having been in small lots for prompt shipment at $15 to $15.25, delivered, for standard No. 2 X. In instances as high as $15.50 has been paid. Sales of No. 2 X Virginia have been larger, particularly for New England delivery, buyers taking on lots ranging from 500 to 1500 tons for second quarter, and in instances second and third quarter at $13, furnace, for No. 2 X. Quite a few sales of 100-ton lots, for prompt and second quarter, have also been sold to consumers in this district. Southern foundry iron for third quarter delivery has been sold in moderate lots to local consumers at $11, Birmingham, for No. 2 foundry. While there is a comparatively good inquiry for the general foundry grades prospective buyers show some hesitancy in closing, while producers are not forcing business, in view of the general market conditions as well as the uncertainty of the coke supply. Several small lots of rolling mill forge iron have been sold at equal to $14.50, delivered here, with moderate inquiries still before the trade. There has been some further movement in steel making pig iron, one transaction involving between 4000 and 5000 tons of basic iron at close to $15, delivered, being reported. Central Pennsylvania steel makers, who have had inquiries out, have not closed, it is stated, for any important tonnage. Makers of basic are not anxious to sell at the present basis of prices, and name, in instances, $15.50, delivered, for third quarter shipment, which consumers are not yet willing to pay. Some 4500 to 5000 tons of standard low phosphorus iron have been sold, upward of 2000 tons being for delivery in this district and about the same tonnage for Western shipment. These sales involve prompt second and third quarter shipments and were practically all on the basis of $19.50, delivered here. Deliveries on all grades are being taken freely, with a consequent decrease in stocks, and the market is strong. The production of basic iron will be slightly increased in the near future, as the Alan Wood Iron & Steel Company expects to blow in its new No. 3 Heckscher furnace April 22, keeping its present active stack in operation. The following range of quotations is named for standard brands, for near future delivery in buyers' yards in this district:

Eastern Pennsylvania No. 2 X foundry	$15.00 to $15.25
Eastern Pennsylvania No. 2 plain	14.75 to 15.00
Virginia No. 2 X foundry	15.75 to 16.00
Virginia No. 2 plain	15.25 to 15.50
Gray forge	14.50
Basic	15.00
Standard low phosphorus	19.50 to 19.75

Ferroalloys.—Eighty per cent. ferromanganese for second half delivery is now being generally quoted at $43.50, Baltimore, but little business is passing. Prompt lots have been sold at $45.50 to $46, and in one instance $50 is reported to have been paid. Prompt lots, less than carloads, bring as high as $55, Baltimore. A sale of a small lot of 50 per cent. ferrosilicon has been made at $70, delivered. Furnace ferrosilicon, ranging from 10 to 11 per cent., is quoted at $23.80 to $24.80, delivered.

Billets.—A very satisfactory demand for both rolling and forging billets is noted. Mills in the East are operating close to capacity. Specifications are coming out freely and a good volume of inquiry for moderate lots is reported. Prices are firmly maintained, with slight premiums paid for certain grades of forging billets. Quotations for basic open-hearth rolling billets range from $22.40 to $23.40, and forging billets, $26.40 to $28.40, delivered in this vicinity.

Plates.—The demand continues unabated. Eastern mills are receiving a number of fairly good sized orders for various classes of plates, while specifications have, in instances, been in excess of the normal production rate. Few contracts are being entered, as makers are not anxious for this class of business, and, when taken, they rarely cover delivery beyond the second quarter. On the general run of business, 1.35c., delivered here, is readily obtained, although on desirable orders 1.30c. can still be done.

Structural Material.—New developments in this immediate territory have been comparatively light. The bulk of the demand has been for small lots of plain shapes, for which 1.35c., delivered here, has been readily obtained. No large lots, which would test the market, have come out, but 1.30c., delivered, could no doubt still be done on desirable orders. Fabricated structural work has been quiet; some small buildings have been contracted for, but the larger propositions on which the trade has been figuring are still held in abeyance.

Sheets.—Orders show a slight decline, owing to the higher prices named for the general run of sheets. Eastern mills, however, are still receiving enough business to keep them engaged at full capacity, with the bulk of the business offered subject to prompt and near future shipment. Western sheets are firmer, with 2.05c. to 2.10c. usually quoted for No. 28 gauge, although Eastern mills making smooth, loose-rolled sheets easily obtain from ¼c. to ½c. per lb. advance.

Bars.—The adherence to the advanced price for iron bars has resulted in some hesitancy to place orders on the part of buyers, who await developments as to their maintenance. Some small business is moving at 1.27½c. to 1.32½c., delivered, for the ordinary grades of iron bars. Reports of an advance in steel bars to 1.35c., delivered here, are heard, although business is still being placed at 1.30c., delivered.

Old Material.—There has been a sharp upward movement in the price of No. 1 heavy melting steel scrap, due partly to purchases made and partly to the refusal of merchants to sell at recent quotations. Sales of a 1000-ton lot at $13.25 and a 5000-ton lot at $13.50 are reported. The market also feels the strength of additional inquiry for this grade. The other leading varieties of old material have been rather quiet. Wrought turnings have sold at slightly higher prices, as have also old railroad grates and stove plate. Sellers generally are not offering material, holding for higher figures. The following range of prices about represents the market for prompt deliveries in buyers' yards, east-

ern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to $1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap and crops	$13.25 to $13.75
Old steel rails, rerolling (nominal)	14.00 to 14.50
Low phosphorus heavy melting steel scrap	15.75 to 16.00
Old steel axles	17.00 to 17.50
Old iron axles (nominal)	23.00 to 23.50
Old iron rails (nominal)	16.00 to 16.50
Old car wheels	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Wrought iron pipe	12.00 to 12.50
No. 1 forge fire	11.50 to 12.00
No. 2 light iron (nominal)	7.00 to 7.50
Wrought turnings	10.00 to 10.50
Cast borings	9.50 to 10.00
Machinery cast	13.75 to 14.00
Railroad malleable (nominal)	11.75 to 12.25
Grate bars, railroad	10.25 to 10.75
Stove plate	10.25 to 10.75

Coke.—The situation is still unsettled and furnace coke for prompt shipment is scarce and high in price. Some uncertainty still surrounds the uninterrupted supply of this grade. In the meantime producers quote as high as $2.75 at oven for prompt shipment, although from $2.25 to $2.50 is named for deliveries over the second half of the year. A small movement in both prompt and forward foundry coke is noted, with quotations ranging from $2.60 to $3 at oven, for prompt, and $2.50 to $2.75 for future. The following range of prices, per net ton, delivered in this district, is named:

Connellsville furnace coke	$4.50 to $5.00
Connellsville foundry coke	4.75 to 5.25
Mountain furnace coke	4.10 to 4.60
Mountain foundry coke	4.35 to 4.85

Cleveland

CLEVELAND, OHIO, April 16, 1912.

Iron Ore.—The heavy buying continued the past week but has now commenced to subside somewhat. Practically all the larger consumers have placed contracts and a very heavy tonnage has been sold. Eastern sales so far have not been as large as some of the sellers expected, considering the prices offered, but conditions that prevail in the East do not tend to cause consumers to do all their buying of Lake Superior ore in a short period as the bulk of the buying is done in the Central West. Eastern sales are looked for from time to time and Lake ore sellers expect to book a good tonnage for Eastern shipment before the season is over. While prices on Bessemer ores seem to be fairly well maintained, some cutting of 10c. a ton is reported on non-Bessemer, sales of Old Range non-Bessemer being made at $2.95 and of Mesaba non-Bessemer at $2.75. Some Old Range non-Bessemer that previously has been sold with a bonus of 10c. and 15c. a ton is being sold this year with the bonus cut off. Vessel carrying charges have finally been established at 40c. net from the head of the lakes and 35c. from Marquette, or 5c. less than last year. The rate from Escanaba is not yet fully determined. A corresponding reduction would make it 25c. net, but it may be maintained at 30c. net. The reduction in unloading charges will probably be to 10c. from 15c. a ton. A large amount of vessel capacity for ore shipment has been lined up in the past few days, and it is expected that a heavy vessel tonnage will be contracted for before the present week is over. While vesselmen look for the busiest season they have ever had in the Lake trade, it is generally conceded that at the low ore rates a large share of the boats will be able to make little if any money for their stockholders. Owing to the ice conditions it is expected that it will be late next week before any of the freighters make a start. We quote ore prices as follows: Old Range Bessemer, $3.75; Mesaba Bessemer, $3.50; Old Range non-Bessemer, $3.05; Mesaba non-Bessemer, $2.85.

Pig Iron.—A local pig iron interest has become a new factor in the basic market in the past few days, as it is understood to have sold 21,000 tons of basic to a Kentucky steel plant for the last half at $12.50, Cleveland furnace, or $14.25 delivered. Reports also credit the same seller with taking on 15,000 tons of basic for shipment to a steel company in southern Ohio for the same delivery. Other Cleveland sellers show no disposition to meet the price made, which is fully 50c. under the ruling market. The demand for Northern foundry grades is more active, and considerable tonnage has been sold during the week for last half delivery, mostly at the same price that prevailed for the second quarter. The market is firm and in some cases sales are being made at an advance of 25c. over recent prices. Quotations for the remainder of the year for No. 2 foundry range from $13 to $13.50, northern Ohio furnace. We note the sale of 3000 tons of No. 2 foundry to a nearby stove manufacturer for the last half, the price being understood to have been $13, Cleveland furnace. The same buyer also took 2000 tons of silvery. A local stove manufacturer has bought 2000 tons of No. 2 foundry for the last half and a Detroit stove maker 4500 tons of Northern foundry for the same delivery. The demand for Southern iron is active. A leading pipe interest is reported to have bought in the past three weeks about 100,000 tons for second and third quarter delivery. We note one Ohio sale of 800 tons of No. 2 Southern at $11, furnace, for the last half. Several inquiries are pending for lots of 500 to 1000 tons. The recent advance of 50c. a ton announced by Jackson County furnaces is not being maintained. The new price is being shaded at least 25c. We quote the following prices for prompt shipment and for the second quarter, delivered Cleveland:

Bessemer	$14.15
Basic	13.75
Northern No. 2 foundry	$13.25 to 13.50
Southern No. 2 foundry	15.10 to 15.35
Gray forge	12.50 to 12.75
Jackson silvery, 8 per cent. silicon	17.30 to 17.55

Coke.—The scarcity of furnace grades for prompt shipment continues and prices range from $2.75 to $3 per net ton at oven. Sellers look for an improvement in the labor situation and easier prices within a few days. The demand for foundry grades is light. Consumers accumulated some stocks at the time the coal operators were negotiating with the miners over wages and are now buying only what they absolutely need. We quote standard 72-hr. foundry coke at $2.75 to $3 per ton.

Finished Iron and Steel.—The market is in a very satisfactory condition. Current orders are coming out in good volume and there is good contracting for steel bars, plates and structural material. Owing to the fact that some of the mills are 30 days or more behind in deliveries in some lines consumers are more inclined to buy for stock than they have recently been and the firmness of the market is making buyers eager to place contracts. The latter condition has brought the agricultural implement trade into the market earlier than usual this year and a large share of that trade in this territory has placed contracts during the week on the basis of 1.15c., Pittsburgh. Some of these contracts extend from July to July, but other sellers refuse to sell to the implement makers beyond January 1. The advance to 1.20c. on steel bars announced by the Carnegie Steel Company to become effective April 20 will probably be followed by a similar advance by some of the independents. Mills generally are making plate and shape contracts to October 1 and some mills will not sell steel bars for a longer delivery except to the implement trade. Plates and shapes are firm at 1.20c., Pittsburgh. Leading makers have advanced sheet prices to 1.90c. for No. 28 black and 3c. for No. 28 galvanized, but not sufficient business has come out to test the new prices. The Cambria Steel Company has taken a contract for 800 tons of 75-lb. standard section rails for a traction line from Cleveland to North Randall. Spring weather has brought some improvement to the bar iron trade. We quote iron bars at 1.20c., Cleveland mills.

Old Material.—Some inquiry for heavy steel scrap came during the week from dealers in the Pittsburgh district, but the price offered, $12.75, delivered, or $11.25, Cleveland, was not attractive. The local demand is not active. Cleveland mills are offering $11.50 to $11.75 for heavy melting steel, but dealers will sell at the latter price only small tonnages that they are anxious to move. Generally they are holding steel scrap at $12. The only new railroad list out is the Norfolk & Western, which closes April 17. Dealers' prices, f.o.b. Cleveland, which are unchanged, are as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.25 to $12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.50 to 12.00
Old car wheels	12.00 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Light bundled sheet scrap	9.50 to 10.00

Per Net Ton.

Iron car axles	$18.50 to $19.00
Cast borings	6.75 to 7.00
Iron and steel turnings and drillings	7.25 to 7.50
Steel axle turnings	7.75 to 8.00
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, April 17, 1912.—(*By Telegraph.*)

Pig Iron.—For last half shipment, a nearby manufacturer purchased last week 21,000 tons of basic from a Northern producer. Aside from this sale there is nothing to interest the trade in this territory. Inquiries are very scarce for foundry iron, it being understood that consumers are fairly well covered for the next few months, and therefore not now taking any interest in market conditions. Conflicting reports are circulated as to Southern iron prices. Prompt shipment quotations with several sellers range from $10.75 to $11, Birmingham, but there are other producers who would take on business at $10.50. A number of small contracts have been closed for Southern No. 2 foundry for third quarter delivery at $10.75, Birmingham, and at $11 for fourth quarter shipment. While stagnant conditions prevail in this market just now, it is generally believed that the recent price advance will stick. Northern foundry iron shows little activity, about the largest sale reported being to an Ohio melter who has contracted to take 1500 tons for this year's delivery based on $13.50, Ironton, for No. 2 foundry. Hanging Rock furnaces are understood to be maintaining this same price for spot shipment iron. There is little demand for malleable, and the price remains at $13.50, Ironton, for any shipment this year. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern coke, No. 4 foundry	13.00 to 13.50
Southern gray forge	13.00 to 13.50
Ohio silvery, 8 per cent. silicon	16.70 to 17.20
Lake Superior coke No. 1	14.95
Lake Superior coke No. 2	14.70
Lake Superior coke No. 3	14.45
Basic, Northern	14.70
Standard Southern car wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(*By Mail.*)

Coke.—Consumers of both furnace and foundry coke are having some trouble in getting shipments on time. It is also rumored that a number of producers are not making any special efforts to ship out on contracts made some time ago at prices very much below those now prevailing, and that they are taking advantage of any pretext to cancel these contracts on which they are losing money. Contract prices in the Connellsville field have stiffened and are now about on a par with spot shipment quotations. Furnace grades are quoted all the way from $2.35 to $2.75 per net ton at oven, and 72-hr. coke is quotable around $2.75 to $3. In the Wise County and Pocahontas districts prices range from 10c. to 15c. a ton below the figures named, for either prompt or deferred shipment. Very little new business is coming up.

Old Material.—Although prices have not weakened, local dealers are not so optimistic as previous reports indicate. The demand for scrap material, of all kinds, is light, although cast borings show some improvement. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	$7.50 to $8.00
Old iron rails	12.25 to 13.00
Relaying rails, 50 lb. and up	20.00 to 21.00
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.00 to 9.50
Heavy melting steel scrap	9.25 to 9.75
Old car wheels	11.25 to 11.75
Per Net Ton.	
No. 1 railroad wrought	$9.75 to $10.25
Cast borings	5.50 to 6.00
Steel turnings	5.75 to 6.25
No. 1 cast scrap	10.00 to 10.50
Burnt scrap	6.50 to 7.00
Old iron axles	13.00 to 13.50
Locomotive tires (smooth inside)	11.25 to 11.75
Pipes and flues	7.00 to 7.50
Malleable scrap	7.50 to 8.00
Railroad tank and sheet scrap	6.00 to 6.50

Finished Material.—So much building construction has been delayed by weather conditions that it is quite probable the spring and summer seasons will be very satisfactory ones for structural steel fabricators. Reinforcing concrete bars are also in good demand. Both galvanized and black sheets are excellent sellers just now, with recent advances strictly adhered to by the local manufacturer. Steel bars are quoted at 1.15c. Pittsburgh and structural material at 1.20c. Local warehouse quotations are unchanged at 1.60c. and 1.70c., respectively.

Birmingham

BIRMINGHAM, ALA., April 15, 1912.

Pig Iron.—All the news here in connection with pig iron this week is of a distinctly "bullish" nature. There have been several thousand tons sold on a basis of $11 for No. 2 foundry, with some sales as high as 1000 tons each. Iron for prompt shipment is bringing just as much as forward delivery iron. The situation is undoubtedly strong so far as the Southern producers are concerned. Low grades continue very scarce, with practically none available for new orders. There has been no change in the rate of production this month, and none is expected in the next 60 or 90 days, unless it should be necessary to put out one or two stacks for relining. It is expected that if the sale of steel rails continues good, one interest here may, to a large extent, withdraw from the foundry iron market. There have been some large sales of warm blast charcoal iron in the past few weeks, but there has been no change in the quotations for that iron. Prices remain as follows, f.o.b. cars furnace yards, Birmingham:

No. 1 foundry and No. 1 soft	$11.50
No. 2 foundry and No. 2 soft	11.00
No. 3 foundry	10.50
No. 4 foundry	10.00
Gray forge	9.75
Basic	10.50
Charcoal iron	22.00 to 22.50

Cast Iron Pipe.—A number of good inquiries are pending, and several smaller lots have been booked, running from carloads up to 1000 tons each. The smaller cast iron pipe makers are all fairly busy, and there has been some improvement in the demand for sanitary pipe with the opening up of the spring season. Quotations on water pipe remain very firm on the following schedule, per net not, f.o.b. cars at foundries in Alabama: 4 to 6-in., $23; 8 to 12-in., $22; over 12-in. average, $21.

Old Material.—No sales of any consequence have taken place the past week. Some old wheels are being offered, but there has been little evidence of any marked interest in the scrap iron market here for some time. Prices continue very firm and dealers seem inclined now not only to hold the stocks they have but in some instances are adding on small lots that are picked up at good figures. There has been some demand for relaying rails. Dealers continue to quote, per gross ton, f.o.b. cars at yards, Birmingham, as follows:

Old iron axles (light)	$12.50 to $13.00
Old steel axles (light)	11.50 to 12.00
Old iron rails	11.50 to 12.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	6.00 to 6.50
No. 2 country wrought	5.50 to 6.00
No. 1 machinery	8.50 to 9.00
No. 1 steel	8.00 to 8.50
Tram car wheels	7.50 to 8.00
Standard car wheels	9.50 to 10.00
Light cast and stove plate	6.00 to 6.50

Coal and Coke.—Alabama coal producers still find a very good market for their production, in spite of the fact that at this season prices are usually much lower. Quite an effort has been made in the past few months to introduce Alabama coal into new fields, and it is therefore finding a wider market than for many years. While the prices are very satisfactory as compared with previous years, yet it must be borne in mind that the cost of mining is gradually increasing here, due to the fact that the mines are being driven further into the ground, entailing much greater cost for pumping, haulage, etc. Coke continues in excellent demand. Alabama coke is bringing a slight premium, because little Virginia coke is now coming into this territory. Prices are very firm at $3.25 to $3.75, f.o.b. ovens for good foundry coke.

St. Louis

ST. LOUIS, MO., April 15, 1912.

The strength in the market continues in accentuated form. Evidences are growing that buyers are not being kept out of the market to any material extent by the higher stronger prices. Purchases during the past seven days have aggregated considerably more than during the preceding seven days, and reports from representatives are that there is in close sight a buying movement of large proportions for this territory. The demand is general, the needs not being confined to any one class of consumers.

Pig Iron.—Prices are held firm at $11 for No. 2

Southern, Birmingham basis, and $13.50 for No. 2 Northern, Ironton basis. The sales of the week include 2,000 tons of malleable, 10,000 tons of basic, 2,500 tons of mixed grades for special use and a large number of small orders below the 500 ton mark. No. 3 foundry is in some demand at $10.50. Practically all the sales of the week have been for last half delivery and the sales have been made at the top prices quoted. No sign of weakness is shown by furnaces and very little hesitancy on the part of buyers.

Coke—Demand during the week has been rather quiet, the consumers apparently being of the opinion that there will be a further drop in prices. Contracts, it is stated, can be made now on a basis of $2.50 for foundry grades, either Connellsville or Virginia, best 72-hr. selected, but buyers want better figures. The by-product coke supply seems to be well sold up and the quotation is $5.40 delivered, but this is nominal, as none is moving.

Finished Iron and Steel—In structural material orders during the week have been fair, considering the quantities previously placed. Fabricating shops continue to show increased activity, and as the contracting season has been delayed by the severe weather, it is expected that there will be considerable extension of the spring movement. The prices are very firm at 1.20c. Pittsburgh. The situation in bars is very much the same as in structural shapes. Standard rails show no change from last week, but the repair work necessitated by the floods in the Mississippi Valley is expected to bring in some demand shortly. Otherwise there is not likely to be any business of importance in this territory before the last of May. Track fastenings are exceptionally active and specifications are already, in many cases, far in excess of the contract totals. The situation in plates is good and the prices are stiff at last quotations. In light rails there is fair business moving, both the coal and the lumber interests being conservative buyers.

Old Material—The scrap market shows stiffening tendencies despite the large quantities which are coming out. The lists of the week include 10,000 tons from the Baltimore & Ohio and about 400 tons each from the Chicago & Alton and the New Orleans & Northeastern. The active demand seems to be coming from the steel mills and foundries, with some request from the rolling mills. The dealers have moved up prices somewhat. We quote f.o.b. St. Louis as follows:

Per Gross Ton.

Old iron rails	$14.00 to $14.50
Old steel rails, re-rolling	11.50 to 12.00
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	21.50 to 22.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	11.00 to 11.50
Frogs, switches and guards cut apart	10.50 to 11.00

Per Net Ton.

Iron fish plates	$12.50 to $13.00
Iron car axles	17.50 to 18.00
Steel car axles	15.00 to 15.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Railroad springs	9.25 to 9.75
Locomotive tires, smooth	11.50 to 12.00
No. 1 dealers' forge	8.50 to 9.00
Mixed borings	6.00 to 6.50
No. 1 busheling	8.50 to 9.00
No. 1 boilers, cut to sheets and rings	7.50 to 8.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.00 to 8.50
Railroad malleable	9.00 to 9.50
Agricultural malleable	8.00 to 8.50
Pipes and flues	7.50 to 8.00
Railroad sheet and tank scrap	7.00 to 7.50
Railroad grate bars	8.00 to 8.50
Machine shop turnings	7.00 to 7.50

San Francisco

SAN FRANCISCO, CAL., April 9, 1912.

A perceptible improvement is noted in the coast market this month. Few orders of special importance are reported by mill representatives, but the small trade is much more active than in February or March, being at present about normal in nearly all departments. Both merchants and mill agents feel some encouragement as to the future, owing to the revival of building activity and the beginning of work on improvement projects in the interior. Prices also are a little stronger in some lines.

Bars.—The local bar market is in better shape than for several months. The soft steel trade is now fairly profitable to merchants, who have again advanced their prices, and the rising market has stimulated an active buying movement in the small trade. As little surplus stock is carried, merchants also are buying more freely. The principal feature in reinforcing material is the placing of a large order for bars and light angles for dam construction and the anticipation of further business of the same nature in the near future. There is also a good-sized inquiry for local harbor work, and general contracts have been let for several large reinforced concrete buildings. Prices on reinforcing steel, however, are still rather easy. Merchant bars, from store, San Francisco, are quoted as follows: Small lots, 2.25c. for steel and 2.15c. for iron; carloads, 0.15c. less.

Structural Material.—March building records were encouraging, all coast cities but Los Angeles showing a substantial increase over the preceding month, though several fell behind March, 1911. Locally, the building permits represented a value of $2,593,780, the largest total in nearly three years. Very little steel work has been let in the last fortnight, the numerous prospective jobs mentioned at the close of March being temporarily delayed. Owing to a disagreement as to time allowance, the Judson Mfg. Company gave up the Kahn Bros. contract in Oakland, and the job was finally placed with Milliken Bros. The only other award of special interest was the Sullivan & Considine theater, Portland, Ore., to the United States Steel Products Company, though a few small jobs have been taken by local fabricators and the McClintic-Marshall Construction Company has a small bridge near Oakland, Cal. Competitive plans for the new city hall, which is expected to take about 6,000 tons, will be received July 1 and should be ready for figuring within six months. Plans for the Pacific Telegraph & Telephone building and the city jail at Portland, Ore., will probably be out next month and the Morrison Trust Company is planning a 10-story building in the same city. Bids will be taken April 15 for steel for the Supreme Court building, Salem, Ore. Quite a lot of San Francisco apartment houses, requiring 50 to 150 tons each, are in the market or coming up shortly. At the moment local fabricators have little on hand and close figuring may be expected for some time.

Rails.—A few substantial orders for light sections have been placed by loggers and small orders from street railroads, largely for grooved rails, continue fairly numerous, but there have been no transactions of special interest in standard sections. Some projected interurban extensions have not been provided for, however, and new inquiries are expected at any time.

Sheets.—The month has opened with a brisk revival of the jobbing trade, both black and galvanized sheets being in good demand and merchants are taking more interest in the market than for some time past. Specifications and new orders from the pipe manufacturers are fully up to the recent average with conditions favorable to continued activity.

Plates.—Nothing new has developed in the way of large tank jobs, and the jobbing trade in tank steel is rather quiet. Two more steamships have been ordered by coast concerns, but will be constructed in the East.

Merchant Pipe.—Small consumers are coming into the market this month on a larger scale than was anticipated, the movement being considerably larger than a year ago. Merchants have little on hand and are accordingly buying freely for immediate delivery. Some curtailment is expected during the summer, however, and purchases are kept down pretty closely to the needs of the next month or two. The oil situation is a little more favorable to the development of new wells, but there is no general activity in the fields as yet. An inquiry for a large tonnage of oil line pipe seems to be taking definite shape, and the order may be placed within a week or two. There is also an inquiry from the Hawaiian Electric Company for a small oil line on Honolulu harbor.

Cast Iron Pipe.—While little important business has been booked so far, there are inquiries for a much larger tonnage than at any time in the first quarter, and the outlook for the remainder of the year is very favorable. The San Diego Gas Company has ordered a small tonnage, and the People's Water Company of Oakland has ordered a small lot of 6-in. pipe. The city of San Diego expects to sell bonds May 7 for extensive improvements to its water system, and is expected to be in the market soon afterward. The town of Orland, Cal., has let contracts for its water system, specifying cast iron pipe. The American Cast Iron Pipe Company has taken an order for a lot of 4 and 6-in. pipe for Vallejo, Cal. The town of Kamloops, B. C., has taken bids on a lot of 6-in. pipe, and Vancouver, B. C., opened bids April 3 for 4920 ft. of 18-in. pipe.

Pig Iron.—The coast pig iron market is rather unsettled, as there is less foreign iron, either here or on the way, than for two or three years, while foundry

requirements have so far been too light to bring out any large buying, notwithstanding the increasing firmness at Birmingham. Any rush of work in the foundries would doubtless cause an active demand for Southern iron, which is now moving in a moderate way on small orders. There is still considerable pig iron scattered about the city, but a normal demand would quickly clean it up. In the absence of new arrivals no definite quotations can be given on English, Continental or Chinese iron. Orders for No. 2 Southern foundry iron are being placed at $20.50, San Francisco.

Old Material.—There is little new development except in steel melting scrap, which is strong at advancing prices, sales having been made this month of quite a heavy tonnage. Prices are as follows: Cast iron scrap, per net ton, $14; steel melting scrap, per gross ton, $11.50 to $12; wrought scrap, per net ton, $12.50 to $15; rerolling rails, per net ton, $11.

Buffalo

BUFFALO, N. Y., April 16, 1912.

Pig Iron.—The active buying reported last week continues, the aggregate of orders since then being about 35,000 tons of all grades for second and third quarter and last half. The large total of sales reached in the last two weeks is owing principally to placements by large consumers with a sprinkling of orders from smaller melters and cannot therefore be said to be the result of a general buying movement, although the inquiry is becoming more general and would indicate a trend in that direction. Competition for new business has been quite sharp in this district and the price situation somewhat ragged in consequence, the active inquiry having brought out quite a variety of prices within a range of perhaps 25c. to 50c. per ton. The explanation of the unevenness in prices is that while the furnaces have booked heavy tonnages for the past two or three weeks their orders for the third quarter and last half have not been sufficient to adequately absorb their total production for that period, leaving quite a large unsold margin. With the continuance of the demand for last half at the present rate, however, prices will undoubtedly soon straighten to a firmer basis. We quote as follows for current and forward delivery:

No. 1 X foundry	$14.00 to $14.50
No. 2 X foundry	13.50 to 14.00
No. 2 plain	13.50 to 13.75
No. 3 foundry	13.50 to 13.75
Gray forge	13.25 to 13.50
Malleable	13.75 to 14.25
Basic	14.00 to 14.50
Charcoal	15.75 to 17.25

Finished Iron and Steel.—The market shows continued improvement in all principal lines, with a steady gain in demand. Bar prices are hardening, and it is understood that there will be further advance to 1.20c. Pittsburgh base on steel bars, on and after Saturday of this week. It is stated that in exceptional instances large customers have this week protected themselves to October 1 at present prices, but mills have been averse to taking on very much tonnage for third quarter at these prices and will now accept only immediate specification for delivery beyond July 1 except at the announced advance. Considerable activity is noted in cold-rolled steel, with a minimum asking price of 67 per cent. discount for carload lots, delivered in base territory, which represents an advance of $1 to $2 per ton. There has been an advance in prices of chain amounting to about $2 per ton, an advance of $1 per ton in the price of Standard spikes, and $2 per ton in the price of sheets, the minimum quotations being 1.90c. to 1.95c. base Pittsburgh, for 28 gauge black, and 3c. base for 28 gauge galvanized.

There is a strengthening in tin plate prices and an extension in delivery, some of the tin plate mills not being in position to make deliveries under 8 to 10 weeks. Business in fabricated structural lines continues good. The Buffalo Structural Steel Company has been awarded contract for fabrication and erection of the 1300 tons of steel for the Buffalo Technical High School, and the Farrar Iron & Steel Company, Buffalo, was low bidder for a small tonnage of steel for the German Roman Catholic Institute building. Bids for the cattle building for the New York State Fair grounds, Syracuse, requiring about 400 tons of steel, are to go in this week, and bids are in for steel for the Erie City Iron Works addition and the addition to the plant of the Erie Foundry Company, Erie, Pa., requiring moderate tonnages. Plans are on the boards for the Syracuse Trust Company's building, the Masonic Temple and office building, Syracuse, and a theatre and store building for Gordon Bros., Rochester, each requiring a good tonnage.

Old Material.—The volume of new business for the week has been rather lighter than for the preceding two weeks, although deliveries on contracts are going forward in very good quantities. Prices are firm and dealers are optimistic as regards the demand in the immediate future. We quote as follows, per gross ton, f.o.b Buffalo:

Heavy melting steel	$12.75 to $13.25
Low phosphorus steel	15.75 to 16.00
No. 1 railroad wrought	14.00 to 14.25
No. 1 railroad and machinery cast scrap	13.50 to 14.00
Old steel axles	18.50 to 19.25
Old iron axles	22.00 to 22.50
Old car wheels	12.00 to 12.25
Railroad malleable	12.50 to 12.75
Boiler plate, sheared	13.75 to 14.25
Locomotive grate bars	11.00 to 11.25
Wrought pipe	9.50 to 10.00
Tank iron	10.00 to 10.25
Wrought iron and soft steel turnings	7.50 to 7.75
Clean cast borings	6.75 to 7.25

Boston

BOSTON, MASS., April 16, 1912.

Old Material.—The market continues strong, with an advance in prices and a growing volume of actual transactions. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$9.75 to $10.25
Low phosphorus steel	11.45 to 11.95
Old steel axles	14.00 to 14.50
Old iron axles	17.00 to 18.00
Mixed shafting	13.00 to 13.50
No. 1 wrought and soft steel	10.00 to 10.50
Skeleton (bundled)	8.00 to 8.50
Wrought iron pipe	8.75 to 9.25
Cotton ties	7.75 to 8.25
No. 2 light	4.50 to 5.00
Wrought turnings	6.50 to 7.00
Cast borings	6.25 to 6.75
Machinery, cast	12.50 to 13.00
Malleable	8.75 to 9.25
Grate bars	6.00 to 6.50
Stove plate	8.00 to 8.50
Cast iron car wheels	11.75 to 12.00

British Market Sharply Advances

Pig Iron Market Active and American Steel Higher

Ferromanganese Up $2.50—Welsh Tin Plate Sold to Standard Oil Company

(By Cable)

MIDDLESBROUGH, ENG., April 17, 1912.

The conviction is growing that the coal strike and the ensuing restriction of output will leave their marks on prices for many months. Big advances are regarded as inevitable. Pig iron is rampant and speculative activity is developing a big general business in view of the resumption of blast furnaces.

American steel companies are unwilling to continue selling sheet bars at the old rates, but might accept 97s. 6d. c.i.f. Their sales in the past few weeks to British sheet and tin plate mills have been heavy. German producers are selling at the old prices.

There is a strong upward swing in finished materials, with broadening demand. The greatest interest attaches to the quarterly meeting of Midland iron masters at Birmingham Thursday.

British works have raised prices of ferromanganese for the United States to £8 1s. 6d. f.o.b. or $43.50 c.i.f. This is an advance of $2.50.

Tin plate prices vary considerably. It is reported that 60,000 boxes have been sold by Welsh makers to the Standard Oil Company at 14s. 3d., shipments beginning in July. Our quotations are higher for all forms of material.

Cleveland pig iron warrants (closing Tuesday), 54s. ½d.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 55s.

German basic steel bars, f.o.b. Antwerp, £5 9s. to £5 10s.

German sheet bars, f.o.b. Antwerp, £5.

German 2-in. billets, f.o.b. Antwerp, 92s.

Steel bars, export, f.o.b. Clyde, £7 2s. 6d.

Steel joists, 15-in. export, f.o.b. Hull or Grimsby, £6 12s. 6d.

Steel ship plates, Scotch, delivered local yard, £7 10s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 5s.

Steel rails, export, f.o.b. works port, £6.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 1½d.

The German Iron Market

Continued High Production with Price Betterment

BERLIN, April 4, 1912.

The iron market situation has grown rather better within a week. The upward tendency of prices has been resumed, and some sections of the trade report business more active. The new price lists given out by the big mixed establishments of the Rhenish-Westphalian district show an advance of about 2 marks per ton for bars, while combinations of dealers at Düsseldorf and some other cities have just raised bars by 5 marks. On the Düsseldorf exchange English No. 3 foundry iron was quoted at 69 to 71 marks, as against 68 to 70 marks for the previous quotation. The Rivet Association voted several days ago to make an advance of 10 marks a ton for rivets for boilers, bridge and ship-building, besides a reduction of the rebate on assorted supplies for the trade by 1½ per cent. The Gas-pipe Association has also just made a slight reduction in its rebates, and an advance of 5 marks a ton on wrought iron piping was recorded at the end of last week. Prices for export also show a rising tendency, after a slight relaxation in certain lines about a fortnight ago. Bars for exports have recently been bought in large amounts, in part for delivery in the fourth quarter, at 110 marks, f. o. b. Antwerp, which means 1 to 2 marks higher than the prices of about the middle of March. Export prices for Belgian products have also risen at Antwerp.

This week's report of *The Iron Age* on the American trade, a summary of which was cabled here, made a strong impression on the Berlin stock market to-day. That the financial community takes a favorable view of iron market prospects is indicated by the fact that iron companies' shares have registered good advances this week, notwithstanding the highly unfavorable money market conditions prevailing throughout March and the general weak and hesitating tendency of the stock market.

The ore market remains firm, but several shipments of Spanish ore, intended for England but diverted to Germany by reason of the coal miners' strike there, were sold at a slight concession. Shipments from the Siegen region have continued active, but hindered to some extent by shortage of cars. The association has just given out the February shipment figures, showing 191,680 tons, against a production of 179,288 tons. The sales for the second half have been substantially completed at the new price of 17.50 marks for the best grades. In the Luxemburg-Lorraine market considerable interest has been caused by a contest for the remaining ore-lands of the duchy of Luxemburg, amounting to nearly 1450 acres. An offer of a yearly rental of about $70 per acre for a period of 50 years was put in by a syndicate of iron companies, but August Thyssen, of the Gewerkschaft Deutscher Kaiser on the lower Rhine, who is now building an iron and steel plant in the southwestern district, made an offer of about $93, and it is supposed that he will get the concession.

In pig iron not much new business for the home market is doing, as requirements for the second half-year have been substantially provided for; and the Syndicate is disposed to treat supplementary orders individually, striking for higher prices wherever possible. The export demand is good, particularly for grades high in manganese. Considerable sales have been made for Russian account. Luxemburg and basic grades have also been selling well abroad at improved prices. The demand for old iron and scrap material has somewhat improved.

English Contributions to Exports in Finished Lines

In semi-finished steel business continues good. Although it had been assumed that consumers had fully covered their demands for the new quarter, they are still sending in supplementary orders, which indicates great activity in finished products. The Union happens to be able to accommodate such buying owing to the hold-up on English deliveries. Some English consumers, however, continue to buy steel freely to be ready for the revival of activity looked for after the coal strike ends. In beams and other structural goods an increase of orders is reported. Dealers are buying actively for the spring trade. Workshops complain of the long delivery dates for construction material, and prices for this kind of structural steel have latterly risen.

The Bar Trade in Excellent Shape

The bar steel trade is in a most excellent shape, as indicated by the advance of prices already mentioned. The trade reports agree in representing the position as unusually favorable. Mills are running at their utmost capacity, and consumers are pressing for delivery of goods on order. It is asserted that on new orders for quick delivery almost any price can be obtained. Many establishments have orders running well into the last quarter of the year. The export trade is also very active, and foreign buyers are also paying fancy prices for quick delivery on pressing orders. The export demand for wrought-iron bars is also very good. Mills running on bands are busy and orders extend far ahead. The brisk activity in sheets and plates remains undiminished, although the English demand just now is lighter. Home shipyards continue to send in new orders for ship plates. In thin plates the English market has continued to buy better than in heavy grades; the general export demand has become stronger within the past few weeks. Producers of galvanized sheets have ample work on hand, and a considerable foreign demand is mentioned. Orders for tin plates extend far ahead, and trade has grown more active at better prices.

Wire makers have about covered their requirements in rods for the current quarter. The rod mills are satisfactorily employed, and they also have a pretty good foreign demand, with prices tending upward. The demand for wire and wire nails is unusually strong, but prices are still unsatisfactory, and new competition for business is coming into sight. An attempt of the German mills to reach an understanding with Belgian producers came to nothing.

The Prussian railroads have sent in orders for heavy rails in moderate quantities for early delivery, which fact means some embarrassment for the mills. The other German states have been increasing their orders, and the foreign demand continues good. Further export orders for heavy rails and ties are in sight. Foreign buying in grooved rails has grown considerably more active, and prices are firmer. Locomotive shops have received better home orders than in previous years, and their foreign orders are also fairly large. Hence they have work in sight for some time to come. The demand for other rolling stock is very good.

Better Protection Demanded for German Machinery

Foundries are reported as well satisfied with the spring demand for machine and other castings. At a meeting several days ago of German machinery builders the chairman described last year's business as somewhat better than in previous years, but prices were unsatisfactory. He characterized the year as one of boom conditions along with depressed prices. Nearly all establishments, he added, report an increase of business, but complain of low prices. The society adopted a resolution demanding higher protection for German machinery and calling for better commercial treaties from the standpoint of manufacturers of highly finished goods.

Unification of Tube Interests

The Mannesmann Tube Works, Düsseldorf, which has been arranging to secure control over certain establishments turning out piping, will effect an arrangement, it is believed, with the great Gelsenkirchen and Phönix companies for the control of their tubing product. The Mannesmanns are also assumed to be at the back of an understanding just made between the Wassergas-Schweisswerke Kuntze, Worms, and the Rheinische Stahlwerke, under which the latter is to supply the Kuntze concern with steel. It is freely predicted now that Germany will soon have the equivalent of a great tube trust headed by the Mannesmanns.

In a paper on Koppers regenerative gas ovens installed in Vienna, Austria, read before the Illinois Gas Association, March 20, in Chicago, W. E. Hartman, mechanical engineer of the H. Koppers Company, Joliet, Ill., stated that in 10 years of business 8175 ovens have been built, or are in process of construction, including 380 gas ovens, 1411 in the last four years in the United States. The paper gave an extended table of tests of the Vienna gas plant.

New York

NEW YORK, April 17, 1912.

Pig Iron.—The activity in pig iron referred to one week ago has continued and sales have been large in Eastern territory. Buffalo furnaces have done the bulk of the business; their sales to Canadian melters have also continued on a liberal scale. There has been some good buying by malleable manufacturers in New England, one transaction amounting to over 8000 tons. A foundry in another line bought 10,000 tons, and there have been several sales ranging from 1000 to 5000 tons, with a considerable number running 300 to 500 tons. Prices have remained on the level of previous transactions, those of Buffalo furnaces ranging from $13.50 to $14 for No. 2 X at Buffalo. A number of buyers have covered for the entire second half of the year, an indication of confidence that the present level will at least be maintained, consideration also being given to the possibility of an advance later in the year. Charcoal iron has been in particularly good demand, and one Michigan interest has sold more charcoal iron in the past ten days than in any equal period in its history. Charcoal iron for car wheels is increasingly called for and there is more disposition on the part of makers of special castings to pay the charcoal iron price rather than to substitute coke iron costing less. Virginia and eastern Pennsylvania furnaces have done some business in New England, and one or two sellers in Pennsylvania have made low prices. There are indications that a good deal more iron has been sold in the past two weeks than has been reported. Eastern Pennsylvania producers represented in New York have been interested in the inquiries for basic in that territory, but apart from the 7000 tons recently bought for Harrisburg delivery no actual transactions have been reported. Sellers are asking from $15 to $15.50 according to delivery and would sell freely at the latter figure for the last half. We quote as follows for Northern iron at tidewater: No. 1 foundry, $15.25 to $15.50; No. 2 X, $15 to $15.25; No. 2 plain, $14.75 to $15. We quote Southern iron at $15 to $15.50 for No. 1 foundry and $14.75 to $15 for No. 2 foundry.

Finished Iron and Steel.—Fabricators are one after the other finding their plants at high capacity; there is less competition among them owing to the fact and as a result prices are stiffening. How long this may result is not discussed, as it is realized that the amount of new work in sight is not particularly large, although at the present time estimating is going along vigorously on what may be termed middle-class work. The condition in the fabrication field serves to indicate one reason for the decided improvement in sentiment. Steel bars are strong at 1.15c., Pittsburgh, and though mills are slow to contract for the latter half, not a little business has been done for that delivery and the ruling price has been 1.15c. One particularly interesting departure learned is a contract closed with a consumer requiring about 1000 tons per month for the 1.15c. basis to October 1 but 1.20c. beyond. It seems probable that little business at the 1.15c. basis has been closed for delivery in the last quarter. In bar iron contradictory conditions are noted. One large producer which has been doing business at a minimum of 1.20c. at mill expects an advance in price before long, while another has sold within the last week at a basis of 1.15c. at mill. As regards awards for structural work, it is safe to say that 20,000 tons at this writing are practically closed, including the Stern's store in New York, a 20-story loft building, Broadway and Twenty-sixth street, the addition to the Hotel Bossert, Brooklyn, a 12-story loft building on East Twenty-third street, a loft building on East Thirty-third street and two other buildings requiring together close to 6000 tons. Bids are to go in in two weeks for the 14,000 tons for the Biltmore hotel. Another project for figuring in the early future is a $200,000 highway bridge across the Connecticut river at East Haddam. Lewis F. Shoemaker & Co. closed for 250 tons for a machine shop in Boston; the McClintic-Marshall Construction Company is credited with 425 tons for the Struthers-Wells Company, at Warren, Pa., and it is understood that the Passaic Steel Company is to furnish 1000 tons for the warehouse at 134th street and Walnut avenue, which has been incorrectly credited to another fabricator. Quotations are: Steel bars, plain structural material and plates, 1.31c. to 1.36c.; bar iron, 1.30c. to 1.35c., all New York. Plain material from store, New York, 1.65c. to 1.75c.

Cast Iron Pipe.—Nothing of importance in public lettings is before the trade but private buying continues in good volume with a rather steady flow of inquiries. Eastern foundries have considerably more business booked than at the corresponding time for several years. Prices on carload lots of 6 in. still show considerable variation, with some makers taking business as low as $21 tidewater, per net ton, while others are quoting $22 to $23.

Old Material.—The market is firm, but consumers are strenuously resisting the attempt of dealers to get higher prices. The situation in heavy melting steel scrap is somewhat complicated, as certain dealers have paid as high as $13 delivered in eastern Pennsylvania, while consumers in the same territory name $12.75 as their outside price with some unwilling to pay more than $12.50. Dealers in this vicinity are expecting to get more money for their holdings and it is somewhat difficult for brokers to purchase at a price enabling them to realize any profit on sales to eastern Pennsylvania consumers. More business is being done with rolling mills, while foundries are purchasing a little more liberally. Quotations continue as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting	$10.50 to $10.75
Heavy melting steel scrap	10.50 to 10.75
Relaying rails	20.00 to 20.50
Rerolling rails (nominal)	12.00 to 12.50
Iron car axles	20.50 to 21.00
Old steel car axles	14.50 to 15.00
No. 1 railroad wrought	13.00 to 13.50
Wrought iron track scrap	12.00 to 12.50
No. 1 yard wrought, long	11.00 to 11.50
No. 1 yard wrought, short	10.25 to 10.50
Light iron	4.50 to 5.00
Cast borings	7.00 to 7.50
Wrought turnings	7.50 to 8.00
Wrought pipe	10.00 to 10.50
Old car wheels (nominal)	12.00 to 12.50
No. 1 heavy cast, broken up	11.50 to 12.00
Stove plate	9.00 to 9.50
Locomotive grate bars	9.00 to 9.50
Malleable cast	9.00 to 9.50

Ferroalloys.—Ferromanganese, 80 per cent., is quoted at $43.50, Baltimore, for forward delivery. It is reported, but not confirmed, that 100 tons for prompt shipment sold at $50. Spot supplies are scarce, with demands pending for between 3000 and 4000 tons for forward delivery. There is little enroute here, and it is highly probable that the scarcity will become more acute than it is at present. The price of 50 per cent. ferrosilicon remains at $70, Pittsburgh, for carload lots, with lower quotations for larger shipments.

Metal Market

NEW YORK, April 17, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
April.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
11	16.00	15.87½	43.15	4.20	4.12½	6.80	6.65
12	16.00	15.87½	43.20	4.20	4.12½	6.85	6.70
13	16.00	15.87½	.....	4.20	4.12½	6.85	6.70
15	16.00	16.00	43.35	4.20	4.12½	6.85	6.70
16	16.00	16.00	43.37½	4.20	4.12½	6.90	6.75
17	16.00	16.00	43.40	4.20	4.12½	6.95	6.80

There is no activity in copper, with prices at 16c. and over. Tin is dull, but with steady prices. Lead is easier, with slackened demand. Spelter is stronger, with better inquiry. Antimony is unchanged.

New York

Copper.—Quiet conditions, with prices firm at the 16c. level, have marked the copper market in the last week. Not only have domestic buyers taken little or none of the metal in the last few days but there has been a heavy falling off in exports which is attributed to the high prices. For 30 days' delivery 16.12½c. has been asked and obtained in sales for smaller lots. As for the large consumers, it is apparent, as previously pointed out, that they have well provided for their April and May requirements. Large sellers admit that they are practically sold up in spot, April and May, and that they could not readily supply any unusual demand should it develop. Lake copper is quoted at 16c. to 16.25c. Spot copper is quoted in London to-day at £70 10s. and futures at £71 7s. 6d. The exports this month have been but 10,607 tons.

Pig Tin.—The week has been a dull one. The demand for both spot and futures has been extremely quiet, although prices have held up steadily and shown a slight upward tendency from day to day. That the consumption is good is shown by the quick absorption of arrivals, all of which are delivered against existing contracts. An unusual feature in tin is that nearly all recent offerings of Banca tin for prompt shipment from Holland have averaged 1c. per lb. higher than Straits tin of the same position. Why this unusual difference

exists is not clear. Tin is quoted today at 43.40c. in New York. London prices are £197 15s. for spot and £194 10s. for futures. The arrivals of tin this month have been 3280 tons and there are reported afloat 3625 tons.

Tin Plates.—A further advance of 1½d. has been made in tin plates laid down at Swansea, Wales, which are now quoted at 14s. 1½d. The continued labor troubles in Great Britain are the cause of this advance. Conditions in New York are unchanged, with 100 lb. coke plates quoted at $3.54.

Lead.—The lead market has shared the general quiet conditions which have prevailed during the week in metals. An easier feeling has developed and independents have been selling at lower prices in St. Louis. In New York the price of the American Smelting & Refining Company has been 4.20c. throughout the week and in St. Louis it has been 4.12½c. Independents have done business at this latter figure in St. Louis. Otherwise there have been no changes.

Spelter.—Spelter has become much stronger in the last two or three days, largely because inquiries from big consumers are expected to develop into heavy demands with a none too plentiful supply. Advices received from the West today predicting labor troubles in the ore fields further strengthened the market. Spelter for prompt delivery was sold yesterday at 6.75c., St. Louis, and 6.90c., New York. Special brands command premiums and ordinary prime Western spelter for prompt delivery is not over plentiful. Galvanizers in the Middle West are known to be approaching actual need of further supplies of the metal.

Antimony.—There have been no changes in antimony. Prices quoted are 8c. for Cookson's, 7.75c. for Hallett's and 7c. for Hungarian and Chinese grades.

Old Metals.—The market continues firm and selling prices may be found slightly higher than the following quotations:

	Cents per lb.
Copper, heavy and crucible	14.75 to 15.00
Copper, heavy and wire	14.25 to 15.00
Copper, light and bottoms	13.50 to 13.75
Brass, heavy	9.50 to 9.75
Brass, light	7.75 to 8.00
Heavy machine composition	12.50 to 13.00
Clean brass turnings	9.00 to 9.25
Composition turnings	10.50 to 11.00
Lead, heavy	4.00
Lead, tea	3.75
Zinc, scrap	5.50

Chicago

April 16.—The local market continues to reflect the advancing price of copper and higher prices prevail. Tin quotations also have shown increasing strength. The spelter situation continues somewhat problematical, with the supply scarce. We quote as follows: Casting copper, 16c.; Lake, 16.25c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 44.50c.; small lots, 46.50c.; lead, desilverized, 4.20c. to 4.25c., for 50-ton lots; corroding, 4.50c. to 4.55c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.60c. to 6.85c.; Cookson's antimony, 8.50c., and other grades, 7.50c. to 8c., in small lots; sheet zinc is $8.60, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 13.50c.; copper bottoms, 12c.; copper clips, 12.25c.; red brass, 12c.; yellow brass, 10c.; lead pipe, 4c.; zinc, 5c.; pewter, No. 1, 30c.; tinfoil, 38c.; block tin pipe, 40c.

St. Louis

April 15.—The metal market has been fairly active. Lead is quotable today at 4.17½c. offered and 4.25c. asked. Spelter ranges from 6.60c. to 6.75c. Tin stands at 43.60c.; Lake copper at 16.35c. to 16.60c.; electrolytic copper, 16.35c. to 16.50c.; antimony, 8.35c. In the Joplin mining district there has been considerable conflict between buyers and sellers, but the latter won their point and the sales were on the basis demanded by them. The top price was $55.50 per ton on a 60 per cent. basis and the choicest lots went as high as $57.50. Calamine sold for $27 to $29 on a 40 per cent. basis, with the top price running as high as $32. Lead ore brought $56.50. On miscellaneous scrap we quote as follows: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

The Cambria Steel Company announces the removal of its Chicago office to the new McCormick Building at Michigan avenue and Van Buren street. The offices are on the eighteenth floor.

Iron and Industrial Stocks

New York, April 17, 1912.

The stock market has shown some disposition toward reaction, probably caused by realizing sales, but the majority of stocks show an advance for the period under review. The Can stocks have given a spectacular performance. Colorado Fuel receded sharply from Friday to Monday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com...	1⅛- 2	Pressed Steel, com.	34 - 36⅞
Allis-Chalm., pref...	3¾- 5½	Pressed Steel, pref.	102 -102½
Bald. Loco., com.....	55¾	Railway Spring, com.	32½- 35
Bald. Loco., pref.	106¼-106¾	Railway Spring, pref.	100
Beth. Steel, com...	34¼- 36¾	Republic, com.....	23 - 24¾
Beth. Steel, pref...	63 - 64⅛	Republic, pref.....	76 - 79⅜
Can, com.....	26⅜- 35⅛	Sloss, com.....	47 - 50
Can, pref.....	108½-117¾	Pipe, com.....	17 - 18¼
Car & Fdry., com..	58¾- 61⅛	Pipe, pref.....	54 - 55½
Car & Fdry., pref.	116⅞-118	U. S. Steel, com....	69½- 72⅛
Steel Foundries.....	34 - 35¼	U. S. Steel, pref...	112¼-113⅜
Colorado Fuel.....	27¼- 34¼	Westinghouse Elec..	75 - 76⅝
General Electric....	169 -172	Va. I. C. & Coke...	65 - 66½
Gr. N. Ore Cert....	39¾- 42⅛	Am. Ship, com.....	56 - 59
Int. Harv., com...	115¾-118	Chic. Pneu. Tool...	48 - 48½
Int. Harv., pref....	116 -121⅜	Cambria Steel.....	43½- 44
Int. Pump, com....	28½- 32	Lake Sup. Corp....	30½- 33
Int. Pump, pref....	83 - 83¾	Pa. Steel, pref.....	102
Locomotive, com....	40½- 44	Warwick	10¾- 11
Locomotive, pref....	108½-109	Crucible Steel, com.	12¼- 12⅞
Nat. En. & St., com.	16½- 17	Crucible Steel, pref.	83 - 84
Pittsburgh St., pref.	101¾-103	Harb. Wk. Ref., pref.	98⅛

Dividends Declared

Warwick Iron & Steel Company, semi-annual, 4 per cent., payable May 15.

The Philadelphia Foundry Foremen

The Associated Foundry Foremen of Philadelphia, Pa., held their regular monthly meeting in Columbia Hall on the evening of April 10. President James Whitehead was in the chair. The meeting was the largest in point of attendance and was productive of more general discussion of interest than any held for many months.

The subject for the evening's discussion, "Foundry Kinks," was opened by John Alexander, with a short address on chaplets. "By no means," he said, "are all our foundry troubles due to the chaplets used. At the same time some of them can be traced to that source, particularly where little attention is paid to the class of material used in their manufacture as well as to the methods of storing and caring for them before their use. New material, and the best at that, should be used, or trouble will ultimately result. The relative temperature of the chaplet to the sand in the mold is important, and the avoidance of rust or other conditions which would cause the chaplet to blow is particularly necessary." Mr. Alexander showed samples of various styles of chaplets, comprising the usual types for general work, special chaplets and those used in the old days when chaplets were largely made by the foundrymen themselves.

Mr. Alexander's remarks brought out an extended discussion as to the manufacture of chaplets, the coatings used, and special coatings and methods of use in different foundries for various classes of work. The discussion then became general, covering such subjects as the making of castings in iron molds; the preparation and use of such molds; the gating of castings found difficult to cast satisfactorily; sand mixtures in connection with special work in brass castings, and other shop kinks.

"Foundry Sand, Its Preparation and Use," will be the subject for consideration at the next meeting.

The H. Koppers Company Organized

The business of H. Koppers, contractor for by-product coke and gas ovens, Joliet, Ill., has been taken over by the H. Koppers Company, incorporated under the laws of Maine, with a paid in capital of $500,000. The offices of the company will be removed in the near future to Chicago, where they will be located in the Mallers Building, southeast corner of Madison street and Wabash avenue.

The directors of the company are Heinrich Koppers, Essen Ruhr, Germany; J. C. McMath, Joseph M. Butler, W. E. Hartman and William G. Wise. The organization has been completed by the election of the following officers: President, Heinrich Koppers; vice-president, J. C. McMath; secretary and treasurer, Jos. M. Butler; managing engineer, William E. Hartman.

Personal

Sir Robert A. Hadfield, F. R. S., Sheffield, England, has been elected a foreign member of the Royal Swedish Academy of Science, Stockholm, as "a token of its appreciation of his excellent work in metallurgy." The character of the honor will be appreciated from the fact that there are only 26 foreign members, representing science in all parts of the world. The six other members in the technical sciences class to which Sir Robert has been elected are Thomas A. Edison, Silvanus P. Thompson, Sir W. H. White, Henry M. Howe, V. Marconi and Henri Le Chatelier.

J. W. Carrel, sales manager of the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, returned last week from an extended business trip to Europe.

J. B. Mansfield, formerly manager of the Columbia Iron Works, New Orleans, La., has assumed the general superintendency of the plant of the J. E. Bolles Iron & Wire Works, Detroit, Mich.

Dr. Rudolph Diesel, inventor of the Diesel crude oil engine, which is to be built in the great plant at St. Louis now being erected by the Busch-Sulzer Bros.-Diesel Engine Company, read a paper April 13 on the construction and development of the Diesel engine before the St. Louis Engineers' Club and the St. Louis branch of the American Society of Engineers.

W. E. Corey returned from Europe April 10. It is stated that he will be in this country for only a short time, sailing for Europe May 11.

The many friends of Dr. James C. Bayles, former editor of *The Iron Age*, will be pained to learn that the condition of his health has compelled his retirement to a sanitarium. He is now at Easton, Pa.

Henry C. Frick, William H. Moore, Norman B. Ream, James H. Reed, Percival Roberts, Jr., Charles Steele, Peter A. B. Widener and Robert Winsor were re-elected directors of the United States Steel Corporation for three years at the annual meeting at Hoboken, N. J., on April 15.

Oscar Richie, Kelly Nail & Iron Company, Ironton, Ohio, has returned home from California where he spent the winter.

Charles H. Domhoff, Domhoff-Joyce Company, Cincinnati, Ohio, has returned from a winter's sojourn in California.

William Wigham, assistant to A. C. Dinkey, president Carnegie Steel Company, Pittsburgh, has sailed for Europe to be gone about three months.

R. S. Bryant has been appointed consulting engineer for the Standard Welding Company, manufacturer of seamless steel tubes, seamless steel rims and rings, and bicycle parts, Cleveland, Ohio. Mr. Bryant was formerly connected with the Bryant Rim Company, Columbus, Ohio, and has had long experience in the design and manufacture of automobile rims.

Gunni Jeppesen, for many years designing engineer of the Strauss Bascule Bridge Company, Chicago, has been appointed managing engineer of the company. J. R. Hall, formerly chief draftsman, has been appointed designing engineer, and is succeeded as chief draftsman by A. O. Walker.

John Calder, for the past nine years manager of the Remington Typewriter Works, Ilion, N. Y., has resigned the position, effective May 15, to become assistant to Henry Martin Leland, Cadillac Motor Car Company, Detroit, Mich.

Matthew J. Scammel, superintendent of the Niles blast furnace of the Carnegie Steel Company at Niles, Ohio, has resigned to accept the position of superintendent of the four blast furnaces of the Maryland Steel Company at Sparrows Point, Md. He has been succeeded by F. G. Quigley, formerly blower at the furnace.

Porter Pollock and W. W. McKelvey of William B. Pollock & Co., Youngstown, Ohio, builders of heavy plate work, are in Berlin, Germany, on a business trip.

Thomas Fox, day manager of the sheet mill plant of Whitaker-Glessner Company at Martins Ferry, Ohio, has resigned and has been succeeded by Thomas Vickers. Oliver Birkman of Canton, Ohio, has been appointed general superintendent of the plant.

John Mulvey, formerly connected with the Riter-Conley Mfg. Company, Pittsburgh, has resigned to accept the position of traffic manager of Hubbard & Co., shovel and tool manufacturers, Pittsburgh.

Dr. Paul Goerens, of Aix-la-Chapelle, has been awarded the Andrew Carnegie gold medal for 1912 by the Council of the Iron and Steel Institute. He is a member of the staff of the Royal Technical College at Aachen and has made many contributions to scientific metallurgy. The gold medal is offered in recognition of his research work on the influence of cold working on the properties of iron and steel. The results of his investigations were published in Volume 3 of the Carnegie Scholarship Memoirs of the Iron and Steel Institute.

Prof. H. O. Arnold, Sheffield, and Prof. Thomas Turner, Birmingham, Eng., are to be nominated as independent candidates for membership in the Council of the Iron and Steel Institute. The election is in May and the five retiring members of the Council have been recommended by that body for re-election. In the past ten years the nominees of the Council have been elected without contest.

F. A. Wilmot, who has been president and treasurer of the American Tube & Stamping Company, Bridgeport, Conn., for a number of years, recently withdrew from the company. C. D. S. Miller, who was vice-president, has been elected president.

Denison K. Bullens, metallurgical engineer of the Parish Mfg. Company, Reading, Pa., has been appointed metallurgist of the Carbon Steel Company, Pittsburgh, Pa., effective May 1.

Honorary membership in the American Society of Mechanical Engineers is to be conferred on Dr. Rudolph Diesel on Tuesday evening, April 30, in the Engineering Societies Building, New York, and Dr. Diesel is to deliver an address on the development of the Diesel engine.

John C. Fruit, formerly assistant to the operating manager of the American Bridge Company in the Western division, was elected president of the Joliet Bridge & Iron Company, effective April 1. He succeeds Robert C. Morrison, who died last November.

Bruce Walter, dry blast engineer for the Carnegie Steel Company, read a paper Tuesday night before the Engineers' Society of Western Pennsylvania, Pittsburgh, on "An Improved Method of Drying Air for Blast Furnaces."

W. M. McCleary, formerly with the Whitaker-Glessner Company, Wheeling, W. Va., has been appointed assistant sales manager of the Portsmouth Steel Company, Portsmouth, Ohio.

K. C. Gardner has been appointed sales manager of the forging press department of the United Engineering & Foundry Company, Pittsburgh, Pa.

J. T. B. Bogardus, president Abendroth & Root Mfg. Company, builder of Root water-tube boilers and Root spiral riveted pipe, Newburgh, N. Y., has returned from an extended trip abroad in the interests of the export business of his company.

W. Hume Logan, president Dow Wire & Iron Works, Louisville, Ky., has been re-elected president of the Employers' Association. Henry Vogt, president Henry Vogt Machine Company, is second vice-president.

E. F. Lake has been placed in charge of the laboratory of the Perfection Spring Company, Cleveland, Ohio. Mr. Lake has recently been conducting a consulting metallurgical business. He was formerly steel editor of the American Machinist.

Charles W. Guttzeit, general manager, has resigned from the Titan Steel Casting Company, Newark, N. J.

A. J. Wallace, who has been on the staff of Matthew Addy & Co., Philadelphia, Pa., for a number of years, has severed that connection and become associated with the selling forces of E. J. Lavino & Co., ore, ferroalloy and metal merchants, Bullitt Building, in the same city.

Resulting from the recent death of Treasurer J. D. Culbertson of the National Tube Company, Pittsburgh, some changes have been made in officers. Taylor Alder-

dice, formerly third vice-president, has been made second vice-president, and the office of third vice-president has been abolished. B. C. Moise, formerly auditor, assistant secretary and assistant treasurer, has been made secretary. G. E. Benson, formerly credit manager, has been made treasurer. J. W. McKee has been made assistant treasurer and C. B. Foster, assistant secretary.

Obituary

HENRY SMITH ROBINSON, president Atlantic Works, East Boston, Mass., is dead at the age of 81 years. He was born in Merideth, N. H., January 22, 1831. In 1847 he became assistant engineer for the Hamilton Mfg. Company, Lowell, Mass., and was made engineer of the York Mfg. Company, Saco, Maine, in 1849. He had charge of the steam department of the Pacific Mills at Lawrence, Mass., from 1864 until 1873, when he established the Robinson Boiler Works at East Boston. In 1892 the plant was destroyed by fire and the business was merged with that of the Atlantic Works of which he became president in 1898. He served in the navy and afterward in the army in the Civil War. He was a member of the Naval Engineers' Club and the American Society of Mechanical Engineers. He leaves a son, Joseph M. Robinson, and two daughters.

H. H. BANCROFT, for twenty years a traveling salesman for the H. A. Matthews Mfg. Company, Seymour, Conn., in which he had an interest, died March 29 and the funeral was held at his home in Millbury, Mass., April 3. Mr. Bancroft was well known in the hardware, sheet metal and other lines of trade covered by his company, particularly in the important centers of the Middle West, his territory including St. Louis, Pittsburgh, Cleveland and Chicago. He was also well known to the trade in Canada.

BENJAMIN GUGGENHEIM, presumed to have been among those lost on the ill-fated Titanic, sunk in the Atlantic Ocean April 15, was the fifth of the seven sons of Meyer Guggenheim, and it was he who first drew the attention of M. Guggenheim & Sons to the industry of smelting while representing them in Leadville. He engaged in the manufacture of mining machinery in Milwaukee, Wis., in 1903, and in 1909 was elected president of the International Steam Pump Company. He was born in Philadelphia, Pa., in 1865.

WASHINGTON A. ROEBLING, second, a son of Charles G. Roebling, president John A. Roebling's Sons Company, Trenton, N. J., was another supposed to have gone down with the Titanic. He was one of the managers of the Mercer Automobile Works of Trenton, where he was born about 31 years ago. He went through many of the departments of the Roebling mills before going to the Mercer Company.

GEORGE D. WICK, Youngstown, Ohio, is believed to have been another of the Titanic victims. Colonel Wick was at various times associated with prominent iron and steel companies, comprising successively the Union Iron & Steel Company, Youngstown; Republic Iron & Steel Company, Chicago; Youngstown Sheet & Tube Company, Youngstown; Garry Iron & Steel Company, Cleveland, and Empire Iron & Steel Company, Niles, Ohio.

Receiver Appointed for Emanuel Dreifus & Co.

A petition in bankruptcy has been filed in New York City against Emanuel Dreifus & Co., scrap iron and steel, Philadelphia, as two of the partners reside in New York. William Blau has been appointed receiver under a bond of $120,000. Mr. Blau is reported as saying that the only assets in New York is an account due of over $300,000 by a construction company of New York. A statement has also been made that the liabilities of the business, which was established 10 years ago, are $250,000 and the nominal assets are $780,000. The petitioning creditors are the Joseph Joseph & Bros. Company, $13,298; Morton B. Smith Company, $1,203, and Alfred K. Barker, Inc., $241. The attorneys of the firm, Creevey & Rogers, New York, promise to contest the petition, which alleges that the concern made preferential payments, transferred merchandise and accounts and permitted a large part of its property to be removed.

Pittsburgh and Vicinity Business Notes

The Apollo Sheet Steel Company, recently organized to erect sheet mills at Apollo, Pa., has bought eight acres of ground, and the initial equipment will include six sheet mills, six combination sheet and pair furnaces, four annealing furnaces and a galvanizing department. A power plant of 2200 h.p. will also be installed. Robert Locke is president and general manager; A. M. Oppenheimer, vice-president; Charles P. Wolfe, secretary and treasurer. O. W. Oppenheimer, J. E. Gallagher, W. J. Guthrie and J. H. Jackson are the other directors.

The Shelby Steel Tube Company is now occupying its new three-story office building at Ellwood City, Pa. Lavatories and the heating and ventilating systems are located in the basement. Hot air will be driven through the building in the winter and cold air in the summer. The equipment includes a kitchen and a dining room to accommodate 50 people, and a company restaurant has also been provided. The entire third floor is given over to a hall, which will be used for meeting purposes.

The National Tube Company denies that plans are under way for any extensions or improvements to its Riverside plant, which is located at Benwood, W. Va.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has contracted with the United Engineering & Foundry Company, Pittsburgh, for a steam hydraulic down-cutting shear which is designed to operate on the same principle as the maker's standard high-speed forging presses, the shearing power being obtained by expanding steam in an intensified cylinder, which in turn forces water under pressure of 5000 lb. per square inch into the shear cylinder, all operations being controlled by a single lever. The shear is designed with a capacity for cutting a 20 x 20-in. section as well as cutting a 7 x 24-in. slab, with a speed of 20 cuts per minute. The same buyer has also ordered from the same builder a hydraulic bloom shear of the usual down-cut type designed for a working pressure of 600 lb. per square inch, with a cutting capacity for a section 10 x 10 in.

The Mesta Machine Company, Pittsburgh, has received an order from the Alan Wood Iron & Steel Company, Conshohocken, Pa., for a heavy duty simple Corliss engine with rope drive, for mill service.

Edwin N. Ohl of Pittsburgh and associates are negotiating for the purchase of the plant of the New Castle Forge & Bolt Company, New Castle, Pa., expecting to manufacture roller bearings.

The Enterprise Enamel Company, Bellaire, Ohio, is making an addition to its plant, 60 x 144 ft., which will be equipped with machinery for the manufacture of enameled kitchenware. The Riverside Bridge Company, Martins Ferry, Ohio, will furnish the steel.

It is stated that the American Steel-Copper Appliance Company, recently organized at Pittsburgh, will build a plant at Sharpsville, Pa. Jacob Roth is president; H. J. Kotlar, vice-president; Julius Reisz, secretary-engineer; Ephraim Truxall, treasurer, and Biddle Arthurs, auditor and general manager.

The puddling department of the Wilkes Rolling Mill Company, Sharpsville, Pa., started up last week after an idleness of some months. The plant has been repaired and put in good condition. A number of orders have been booked for muck bar.

The annual meeting of the Industrial and Power Section of the American Institute of Electrical Engineers will be held in the Fort Pitt Hotel, Pittsburgh, April 25 to 27. Among the papers to be presented at the meeting are these: "Electrification of Reversing Mill of Algoma Steel Company," by Bradley T. McCormick; "Operation of Large Electrically Driven Rolling Mill," by W. Sykes; "Advantages of Automatic Control as Applied to Steel Mill Operation," by F. G. Coey.

The Manhattan Rolling Mill, at Twentieth street and Avenue A, New York City, equipped with two heating furnaces and two trains of rolls, which manufactured horseshoe iron but has been closed for some time because of the financial difficulties of the owners, is to be dismantled. It is understood that the site will be utilized for an automobile garage.

The Bethlehem Industrial Commission's Dinner

Addresses by James A. Farrell and Charles M. Schwab

The third annual dinner of the Bethlehem Industrial Commission held in Bethlehem, Pa., on the evening of April 16, was unique in that James A. Farrell, president United States Steel Corporation, and Charles M. Schwab, president Bethlehem Steel Corporation, rivals for domestic and foreign business, vied with each other in telling of each other's achievements. The occasion of the dinner was the movement to bring the business interests of the Lehigh Valley closely together, and the cities of Bethlehem, South Bethlehem, Easton and Allentown were liberally represented.

Mr. Schwab, in speaking of Mr. Farrell, said he first knew him in the wire mills on the banks of the Monongahela River, recognized his resourcefulness and ability, and when in filling the office of president of the United States Steel Corporation, the question of extending that corporation's foreign trade came up, Mr. Farrell was the unanimous choice. The result, according to Mr. Schwab, was that last year the export business of the corporation was far greater than ever before and Mr. Farrell deserves more credit for this branch of the steel business than all others combined. Speaking of the Bethlehem Steel Corporation Mr. Schwab said that five years ago it did a business of $6,000,000 a year. It is now doing $30,000,000 a year and within a short time will enter a period of business amounting to $40,000,000 a year. He predicted that it would do more business this year than any two independent concerns in the country, and said that he had fixed the mark and hopes to see $100,000,000 worth of business a year, which would leave $35,000,000 in wages to the workers of the Lehigh Valley.

Mr. Schwab compared all legislation, local and otherwise, to "waves washing on the sea-shore." He said that in the end legislators must conform with industrial advancement and progress, and that no force could stop the onward march of the tremendous aggregation of capital in this country. He concluded by saying that industry and progress are going ahead in leaps and bounds; that the steel business is now in its infancy, and that the world is going to revolve around the United States as a hub, and he sincerely hoped that the city of Bethlehem would be the axle around which the hub revolves.

Mr. Farrell received a tremendous ovation when he was introduced. He also spoke of the resources and local and natural advantages of Bethlehem, and predicted wonderful growth for the local steel company. Speaking of the political economists' claim that competition is essential to the welfare of a community, he said that the best results, both from a national and an economical standpoint, are found in reasonable and intelligent co-operation rather than in destructive competition. We are living in an age of growth from small to large units and, to compete as a nation with other nations, our energies must be concentrated on creating a sound industrial position domestically, rather than in wasting our resources on methods calculated to affect the earnings of the wage earner, bankrupt the manufacturer, and weaken our position as a factor in the markets of the world. Referring to Mr. Schwab, he said in part:

"When your invitation to me to be present here this evening was received, I had no hesitation in accepting, since it gave me the opportunity of meeting a friend with whom I have had the pleasure of an intimate and lasting acquaintance extending over a period of many years—Charles M. Schwab, my predecessor as president of the United States Steel Corporation. As a co-worker in the steel industry in Pittsburgh and later as his subordinate in the United States Steel Corporation, I had the pleasure of contact with a man whose successful career in a great industry has been an inspiration to those who have been associated with him. His career is probably the clearest illustration we have in this country today of the hights to which genius can ascend without other aid than indomitable energy, perseverance and brains. I do not need, therefore, to apologize for stating in his presence that it is recognized throughout the steel industry that he ranks foremost among those who have raised the iron and steel industry of this country to its present pinnacle of pre-eminence among the industries of the world. It was but natural that his ability should find fitting expression in the monument that he has erected in the Bethlehem Steel Corporation to that genius which already has acquired international reputation.

"Surrounded by associates who reflect in no small measure the skill and aggressiveness of their captain, he has evolved from modest beginnings an integrated corporation which not only controls a capacity of 400,000 tons of pig iron from the Bethlehem furnaces, but an annual capacity of 12,000 tons of armor plates, 200,000 tons of open-hearth ingots and 75,000 tons of castings; it is engaged in the manufacture of cars and owns iron ore mines and limestone quarries of an annual capacity of 300,000 tons, some 40 miles of railroad, 20 locomotives and 1500 cars, shipyards and forging works in San Francisco, the great Harlan & Hollingsworth Corporation and other companies.

"Who can doubt that but for this extensive control of raw materials, the integration of large lines of industry, the great capital employed and available, it would have been impossible to have brought to this country the building of war vessels for Argentine, China and other countries. Foreign shipbuilders and manufacturers have long had a virtual monopoly of shipbuilding facilities for the requirements of neutral countries, but the Bethlehem Steel Corporation, in conjunction with American shipyards, may now be said to have embarked on an era of participation in this important work.

"I mention these ramifications of the Bethlehem Steel Corporation for the reason that it is an exemplification of the latter-day necessity of integration, of economic operation, of the manufacture of steel from the ore up, and the necessity of facilities required not only in order to seek the trade of the world in steel and steamers, in armor plate, guns, munitions of war, structural materials, passenger and freight cars, etc., but also that the requirements of this great country may be fitly served and economies in manufacture and operation effected which it has been demonstrated are impossible to smaller corporations."

Steel Rail Committee Appointed

The subcommittee of three steel manufacturers and three railroad presidents provided for by the action of the large committee created at the rail conference of February in New York City has been announced. Chairman E. H. Gary, of the Steel Corporation, has named E. J. Buffington, president of the Illinois Steel Company and the Indiana Steel Company; F. W. Wood, president of the Maryland Steel Company, and E. A. S. Clarke, president of the Lackawanna Steel Company. President Daniel Willard, of the Baltimore & Ohio, chairman of the executive committee of the American Railway Association, has named James McCrea, president of the Pennsylvania Railroad; W. A. Gardner, president of the Chicago & Northwestern, and F. A. Delano, president and receiver of the Wabash Railroad. Judge Gary and President Willard are members ex officio. A meeting of the subcommittee will be held in New York City Friday, April 19.

The appointment of receivers for the Allis-Chalmers Company, Milwaukee, Wis., through the accompanying order of the court, fully protects all parties dealing with the company and gives assurance of the prompt fulfillment and complete performance of all outstanding and future contracts. The works will be operated by the receivers with no cessation of activity in any line.

The Buffalo Foundry & Machine Company, Buffalo, N. Y., manufacturer of vacuum driers and steam hammers, suffered a loss by fire to its plant April 11. The company states that the loss was confined to a portion of its roof and that its manufacturing facilities are not impaired. There has been no delay in the handling of its business and the plant is now in full operation.

Meetings of the Bridge Builders' Society were held at the Waldorf-Astoria, New York City, April 11 and 12. The Executive Committee met April 11 and the general monthly meeting was held April 12. The only absentees were Western members.

The 1910 Census Statistics of Manufactures

The United States Bureau of the Census, of which E. Dana Durand is director, has issued an abstract of the statistics of manufactures for States, cities and industries as shown by the Thirteenth Census, which is officially designated as of 1910, although the figures cover the calendar year 1909. The abstract, which is prepared under the supervision of W. M. Steuart, chief statistician for manufactures, comprises 96 pages. A great number of tables are presented which classify the leading industries according to States and cities.

The accompanying table gives the principal items of information covered by census inquiries relative to manufactures in continental United States for 1909, 1904 and 1899, together with the percentages of increase from census to census.

The census of 1909, like that of 1904, the report says, was confined to manufacturing establishments conducted under the factory system, as distinguished from the neighborhood, hand, and building industries. Where statistics for 1899 are given they have been reduced to a comparable basis by eliminating, as far as possible, the latter classes of industries. The census does not include establishments which were idle during the entire year, or had a value of products of less than $500, or the manufacturing done in educational, eleemosynary and penal institutions, or in governmental establishments, except those of the Federal Government.

General Comparison of Census Figures for the United States.

	NUMBER OR AMOUNT.			PER CENT OF INCREASE.	
	1909	1904	1899	1904–1909	1899–1904
Number of establishments	268,491	216,180	207,514	24.2	4.2
Persons engaged in manufactures	7,678,578	6,213,612	(1)	23.6	(1)
Proprietors and firm members	273,265	225,673	(1)	21.1	(1)
Salaried employees	790,267	519,556	364,120	52.1	42.7
Wage earners (average number)	6,615,046	5,468,383	4,712,763	21.0	16.0
Primary horsepower	18,680,776	13,487,707	10,097,893	38.5	33.6
Capital	$18,428,270,000	$12,675,581,000	$8,975,256,000	45.4	41.2
Expenses	18,453,080,000	13,138,260,000	9,870,425,000	40.5	33.1
Services	4,365,613,000	3,184,884,000	2,389,132,000	37.1	33.3
Salaries	938,575,000	574,439,000	380,771,000	63.4	50.9
Wages	3,427,038,000	2,610,445,000	2,008,361,000	31.3	30.0
Materials	12,141,791,000	8,500,208,000	6,575,851,000	42.8	29.3
Miscellaneous	1,945,676,000	1,453,168,000	905,442,000	33.9	60.5
Value of products	20,672,052,000	14,793,903,000	11,406,927,000	39.7	29.7
Value added by manufacture (value of products less cost of materials)	8,530,261,000	6,293,695,000	4,831,076,000	35.5	30.3

(1) Figures not available.

The Establishment

As a rule, the term "establishment" represents a separated plant or mill. In some cases is represents two or more plants operated under a common ownership or for which one set of books of account is kept.

If the plants constituting an establishment as thus defined were not all located within the same city or State, separate reports were secured in order that the separate totals might be included in the statistics for each city or State. In some instances separate reports were secured for different industries carried on in the same establishment.

Classification by Industries

The establishments were assigned to the several classes of industries according to their products of chief value. The value of products reported for a given industry may thus, on the one hand, include minor products very different from those covered by the class designation, and, on the other hand, may not include the total product covered by this designation, because some part of this product may be made in establishments in which it is not the product of chief value.

The number of industries for which a separate presentation is made is 264, a much smaller number than in the reports for the census of 1904, in which 339 industries were shown separately. This decrease is due to the fact that an attempt to make a separate presentation would in the case of many industries be misleading, inasmuch as a large part of the product of the class described by the industry designation is made, not by establishments engaged primarily in manufacturing that class of commodities, but by establishments whose principal product is such as to necessitate their classification elsewhere. In order to avoid this difficulty it is necessary in many cases to combine a number of closely related industries under a more general designation. This condition is constantly becoming more conspicuous in the manufacturing business of the country, and consequently the number of industries which can properly be shown separately is smaller at this census than at previous censuses.

Explanation of Terms

Persons Engaged in Manufacturing Industries.—The statistics of the number of proprietors and firm members and the number of salaried employees are based on the returns for a single representative day only. In the case of wage earners a report was obtained of the number employed on the 15th of each month, and from these returns the average number employed during the year has been calculated by dividing the sum of the numbers reported for the several months by 12.

Capital.—For reasons stated in reports of prior censuses the statistics of capital secured by the census canvass are so defective as to be of little value, except as indicating very general conditions.

Materials.—The statistics as to cost of materials relate to the materials used during the year, which may be more or less than the materials purchased during the year. The term "materials" includes fuel, rent of power and heat, mill supplies and containers, as well as materials forming a constituent part of the product. Under the head of "fuel" is included all fuel used, whether for heat, light or power, or for the process of manufacture.

Expenses.—Under "expenses" are included all items of expense incident to the year's business, except interest, whether on bonds or other forms of indebtedness, and allowances for depreciation.

Value of Products.—The amounts given under this head represent the selling value at the factory of all products manufactured during the year, which may differ from the value of the products sold. Amounts received for work on materials furnished by others are included.

Cost of Manufacture and Profits.—Census data do not show the entire cost of manufacture, and consequently can not be used to show profits. No account has been taken of interest and depreciation. Even if the amount of profit could be determined by deducting the expenses from the value of the products the rate of profit on the investment could not properly be calculated because of the very defective character of the returns regarding capital.

Manufactures in Noncontiguous Territory

The table given below covers the more important figures for the manufactures of Alaska, Hawaii and Porto

Rico. The statistics of manufactures included in the census of the Philippine Islands taken by the War Department for 1902 are not comparable with those shown in the reports for continental United States; and there has been no census of manufactures in Guam, Samoa or the Canal Zone. The statistics for Alaska, Hawaii and Porto Rico include some small establishments of the nature of hand or neighborhood industries, such as are omitted from the canvass for continental United States.

Census of Alaska, Hawaii and Porto Rico

	Alaska	Hawaii	Porto Rico
Number of establishments	152	500	939
Persons engaged in manufactures	3,479	7,572	18,122
Proprietors and firm members	135	1,074	1,478
Salaried employees	245	594	1,062
Wage earners (average number)	3,099	5,904	15,582
Primary horsepower	3,975	41,930	34,005
Capital	$13,060,000	$23,875,000	$25,544,000
Expenses	454,000	31,753,000	31,139,000
Services	2,328,000	2,795,000	4,898,000
Salaries	380,000	686,000	1,259,000
Wages	1,948,000	2,109,000	3,639,000
Materials	5,120,000	25,629,000	21,479,000
Miscellaneous	2,006,000	3,329,000	4,762,000
Value of products	11,340,000	47,404,000	36,750,000
Value added by manufacture (value of products less cost of materials)	6,220,000	21,775,000	15,271,000

Another table taken from this abstract is presented herewith, which shows the relative importance of the leading manufacturing industries in 1909 and their growth from 1899 to 1909. This table includes the industries having a gross value of products in 1909 of $100,000,000 or more.

case it indicates that the cost of materials represents a large proportion of the total value of products and that therefore the value added by manufacture, of which wages constitute usually the largest item, is not commensurate with the total value of products.

The classification of copper, tin and sheet iron products in this table comprises the manufacture of all sheet metal products of copper, tin and iron, including the preparation of copper, tin or sheet iron material for building construction. It includes the factory work on cornices, skylights, roofing, etc., but does not include the installation.

The total horse-power of manufacturing establishments was 18,680,776 in 1909, as compared with 13,487,707 in 1904 and 10,097,893 in 1899. In 1909 90 per cent. of the horsepower was that of engines or motors owned by the manufacturing establishments themselves, and 10 per cent. was rented power, mostly electric. Especially striking is the increase in the use of gas engines and of electric power, both that rented from outside concerns and that generated by the manufacturing concerns themselves. The total horse-power of electric motors in 1899, including both those operated by purchased current and those operated by current generated in the establishment was 492,936; in 1909 it was 4,817,140, or nearly 10 times as great. The practice of renting electric power is rapidly becoming more common.

In *The Iron Age* of August 31, 1911, a preliminary report was given of the census statistics on the iron and steel industry. The figures given in the abstract just issued, and which represent the completed work of the Census Bureau on this subject, show some slight varia-

Relative Importance of Leading Manufacturing Industries.

INDUSTRY.	Number of establishments.	WAGE EARNERS. Average number.	Rank.	Per cent distribution.	VALUE OF PRODUCTS. Amount (expressed in thousands).	Rank.	Per cent distribution.	VALUE ADDED BY MANUFACTURE. Amount (expressed in thousands).	Rank.	Per cent distribution.	PER CENT OF INCREASE. Wage earners (average number). 1904–1909	1899–1904	Value of products. 1904–1909	1899–1904	Value added by manufacture. 1904–1909	1899–1904
All industries	**268,491**	**6,615,046**	....	**100.0**	**$20,672,052**	....	**100.0**	**$8,530,261**	....	**100.0**	**21.0**	**16.0**	**39.7**	**29.7**	**36.5**	**30.8**
Slaughtering and meat packing	1,641	89,728	16	1.4	1,370,568	1	6.6	168,740	12	2.0	19.0	8.9	48.6	17.0	52.6	7.3
Foundry and machine-shop products	13,253	531,011	2	8.0	1,228,475	2	5.9	688,464	1	8.0	19.8	3.8	39.5	10.3	34.2	17.8
Lumber and timber products	40,671	695,019	1	10.5	1,156,129	3	5.6	648,011	2	7.6	30.5	4.7	30.7	16.2	23.7	32.3
Iron and steel, steel works and rolling mills	446	240,076	6	3.6	985,723	4	4.8	328,222	4	3.8	15.7	13.3	46.3	12.9	41.0	12.8
Flour-mill and gristmill products	11,691	39,453	30	0.6	883,584	5	4.3	116,008	18	1.4	0.9	21.4	23.9	42.2	24.7	37.0
Printing and publishing	31,445	258,434	5	3.9	737,876	6	3.6	536,101	3	6.3	18.0	12.2	33.6	39.8	30.8	40.6
Cotton goods, including cotton small wares	1,324	378,880	3	5.7	628,392	7	3.0	257,383	7	3.0	19.9	4.3	39.5	32.8	56.7	1.9
Clothing, men's, including shirts	6,354	239,696	7	3.6	568,077	8	2.7	270,562	6	3.2	38.0	10.2	39.7	25.6	38.5	26.5
Boots and shoes, including cut stock and findings	1,918	198,297	8	3.0	512,795	9	2.5	180,060	10	2.1	23.7	6.0	43.4	23.3	36.0	34.3
Woolen, worsted, and felt goods, and wool hats	985	168,722	9	2.6	435,979	10	2.1	153,101	15	1.8	15.0	12.3	36.5	28.4	33.4	20.9
Tobacco manufactures	15,822	166,810	10	2.5	416,095	11	2.0	239,509	8	2.8	4.6	20.3	23.8	25.6	16.8	30.0
Cars and general shop construction and repairs by steam-railroad companies	1,145	282,174	4	4.3	405,601	12	2.0	206,188	9	2.4	19.1	26.4	30.9	42.0	29.9	46.0
Bread and other bakery products	23,926	100,216	14	1.5	396,865	13	1.9	158,831	14	1.9	23.3	35.0	47.2	53.7	39.8	41.4
Iron and steel, blast furnaces	208	38,429	31	0.6	391,429	14	1.9	70,791	30	0.8	9.6	10.6	68.8	12.1	33.9	29.7
Clothing, women's	4,558	153,743	11	2.3	384,752	15	1.9	175,964	11	2.1	32.9	38.2	55.4	55.4	50.5	56.7
Smelting and refining, copper	38	15,628	38	0.2	378,806	16	1.8	45,274	36	0.5	22.6	12.6	57.3	45.8	2.8	2.5
Liquors, malt	1,414	54,579	25	0.8	374,730	17	1.8	278,134	5	3.3	13.4	22.0	25.6	25.9	24.5	20.6
Leather, tanned, curried, and finished	919	62,202	23	0.9	327,874	18	1.6	79,595	27	0.9	8.7	9.8	29.8	28.8	29.5	26.3
Sugar and molasses, not including beet sugar	233	13,526	41	0.2	279,249	19	1.4	31,666	41	0.4	−0.2	−4.1	0.7	15.7	−2.7	77.5
Butter, cheese, and condensed milk	8,479	18,431	36	0.3	274,558	20	1.3	39,012	39	0.5	18.5	21.5	63.2	28.6	54.4	15.1
Paper and wood pulp	777	75,978	17	1.2	267,657	21	1.3	102,215	21	1.2	15.2	32.9	41.8	48.3	22.0	36.4
Automobiles, including bodies and parts	743	75,721	19	1.1	249,202	22	1.2	117,556	17	1.4	528.4	437.7	729.7	532.6	566.3	473.5
Furniture and refrigerators	3,155	128,452	13	1.9	230,887	23	1.2	131,112	16	1.5	12.5	36.0	34.9	36.1	29.9	37.8
Petroleum, refining	147	13,929	40	0.2	226,998	24	1.1	37,725	40	0.4	−16.9	37.4	35.4	41.2	5.9	69.0
Electrical machinery, apparatus, and supplies	1,009	87,256	18	1.3	221,309	25	1.1	112,743	20	1.3	44.3	43.9	57.2	52.3	52.4	72.1
Liquors, distilled	613	6,430	43	0.1	204,699	26	1.0	168,722	13	2.0	20.1	44.0	55.9	35.0	59.7	29.4
Hosiery and knit goods	1,374	129,275	12	2.0	200,144	27	1.0	89,903	23	1.1	24.2	24.4	46.0	43.9	49.1	35.1
Copper, tin, and sheet-iron products	4,228	73,615	20	1.1	199,824	28	1.0	87,242	25	1.0	38.8	38.4	66.6	53.1	55.8	56.6
Silk and silk goods, including throwsters	852	99,037	15	1.5	196,912	29	1.0	89,145	24	1.0	24.4	21.7	47.7	24.3	55.2	28.0
Smelting and refining, lead	28	7,424	42	0.1	167,406	30	0.8	15,443	43	0.2	−2.0	−9.0	−9.9	5.9	−8.5	−46.1
Gas, illuminating and heating	1,206	37,215	32	0.6	166,814	31	0.8	114,386	19	1.3	21.8	36.1	33.2	65.3	30.0	50.6
Carriages and wagons and materials	5,492	69,928	21	1.1	159,893	32	0.8	77,942	28	0.9	−10.2	5.5	2.6	12.7	−0.5	9.6
Canning and preserving	3,767	59,968	24	0.9	157,101	33	0.8	55,278	31	0.7	5.3	−0.1	20.4	21.3	16.8	22.7
Brass and bronze products	1,021	40,618	29	0.6	149,989	34	0.7	50,761	34	0.6	22.5	22.1	45.5	15.5	28.1	23.8
Oil, cottonseed, and cake	817	17,071	37	0.3	147,868	35	0.7	28,035	42	0.3	9.9	41.2	53.4	64.2	71.2	20.8
Agricultural implements	640	50,551	26	0.8	146,329	36	0.7	86,022	26	1.0	6.7	1.7	30.6	10.7	26.0	11.3
Patent medicines and compounds and druggists' preparations	3,642	22,895	35	0.3	141,942	37	0.7	91,566	22	1.1	11.8	7.6	30.9	22.3	17.5	27.1
Confectionery	1,944	44,638	27	0.7	134,796	38	0.7	53,645	32	0.6	23.2	34.9	54.8	43.6	40.1	51.4
Paint and varnish	791	14,240	39	0.2	134,889	39	0.6	45,873	35	0.5	22.4	20.0	37.5	30.6	47.9	24.9
Cars, steam-railroad, not including operations of railroad companies	110	43,086	28	0.7	123,730	40	0.6	44,977	37	0.5	26.5	1.8	11.3	22.8	26.6	28.5
Chemicals	340	23,714	34	0.4	117,680	41	0.6	53,807	33	0.6	19.7	4.1	38.5	20.1	61.5	13.0
Marble and stone work	4,964	65,603	22	1.0	113,093	42	0.5	75,696	29	0.9	26.4	22.6	33.3	33.3	29.9	28.4
Leather goods	2,375	34,907	33	0.5	104,719	43	0.5	44,602	38	0.5	2.1	16.8	27.5	25.9	18.6	28.5
All other industries	61,887	1,648,441	....	24.9	4,561,002	....	22.0	2,084,300	....	24.5	18.5	23.9	41.8	41.5	26.6	47.1

A minus sign (—) denotes decrease

Some of the industries that hold a very high rank in gross value of products, says the report, rank comparatively low in the number of wage earners employed and in the value added by manufacture. Where this is the

tion, but this is not of sufficient consequence to warrant the reproduction of the figures in detail, especially as the statistics thus given are for a period which is now quite remote.

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Mining Men Before the Stanley Committee

Minnesota Iron Company Negotiation with the Merritts

MR. YOUNG. Did you have anything to do at one time with an attempt to sell the old Merritt properties to Mr. Porter, of the Minnesota Iron Company?

MR. SELLWOOD. I tried to buy them for the Minnesota Iron Company. They fixed $1,500,000 as the price for the control of the railroad and the mines.

MR. YOUNG. Did the Minnesota Company offer to take it at that price?

MR. SELLWOOD. They did not. It was in the panic, and I guess they did not have the money.

MR. YOUNG. Mr. Merritt made the statement here that that was because Mr. Rockefeller had warned everybody off; that they must not touch it. Do you think that had any influence on the Minnesota Iron Company?

MR. SELLWOOD. I do not. I remember Mr. Porter said to me, when I hesitated to take it: "I am satisfied it is a good thing, but where are you going to get the million and a half dollars?" This was in January, 1894.

THE CHAIRMAN. Did you ever make any offer on that property for the Minnesota Iron Company prior to the time it was offered to you at $1,500,000 for 51 per cent.?

MR. SELLWOOD. I made them an offer at the rate of $7,000,000 for the whole thing—the railroad and all the mines. This offer was made for the Minnesota Iron Company and the Duluth & Iron Range Railroad. There were three factions in the ownership—the Merritts and Senator Foley, the Chases and Grants, and a man by the name of Harrison. I made Mr. Chase that offer and he submitted it to the Merritts; the Merritts accused me of trying to sell them out. They said the road and property were worth a good deal more than that, and that they did not want to sell it anyway.

Iron Ore Reserves of the United States

Mr. Sellwood was then questioned at length as to the various ore deposits in the United States outside of the Lake Superior region. He was asked concerning the iron ores of Utah, those in Iron County in the southwest part of that State. These lie vertical or almost so. He estimated that there was over 500,000,000 tons in sight, and providing the ore continues in the lowland in the same way as in the mountains there are chances that the amount might reach 1,000,000,000 tons. There is coal within 150 miles, but not a good coking coal. The examination he made was in the interest of John W. Gates. James J. Hill was also interested and Mr. Harriman. The witness had been in Texas, but did not find much ore apart from a small amount of hard high grade ore in Llano County and a low grade ore in Jefferson County. He had been in the Sunrise district of Wyoming and would estimate the amount of ore in that State at 100,000,000 tons. In Wisconsin in the Baraboo district he estimated that 200,000,000 or 300,000,000 tons of ore had been shown up by drill holes. Concerning Michigan ores, Mr. Sellwood thought the estimate of J. R. Finlay—189,000,000 tons—was fair. Of this amount Mr. Finlay had credited 54,000,000 tons to the Steel Corporation. In connection with this statement Mr. Young brought out the estimate of Mr. Hayes, of the Geological Survey, that the low grade ores of the Lake Superior district on all ranges amounted to 75,000,000,000 tons.

Steel Corporation Reserves Not Excessive

Mr. Sellwood was asked whether in view of the blast furnaces and the manufacturing capacity of the Steel Corporation he considered their ore reserves apart from the Hill lease to be excessive. He replied that he did not. At the present rate of exhaustion he thought the northern ores of the Steel Corporation would last 25 to 30 years.

The effort to get an estimate of the iron ores of the United States being resumed, Mr. Sellwood was asked to estimate ores in other districts than had been touched upon. He put those of New Mexico at 100,000,000 tons, those of California at 250,000,000 tons, and of Texas at 50,000,000 tons. The merchantable ore of New York State he estimated at 200,000,000 tons. He made no estimate for Alabama, not being familiar with the ores of that State.

The merchantable ores of the Moose Mountain district in Canada he estimated at 100,000,000 tons. The company also knows of about 200,000,000 tons of ore running 40 per cent in iron. The ores of the Atikokan district in western Ontario he estimated at 10,000,000 tons. He made no estimate of the ores of Newfoundland. Concerning Brazilian ores, Mr. Sellwood said:

> Some of our people in Duluth are interested in the iron ores of Brazil. They say the deposit is greater than the Marquette Range. They are negotiating now, I know, with some people in Germany for the sale of that ore. From their talk I think they estimate that they have about 500,000,000 tons.

New Steel Companies and Ore Supply

The examination turned to the question of the amount of ore a company desiring to enter upon steel manufacture would need to have as a reserve in order to enter into competition with existing companies. It was estimated that the Cambria Steel Company had about 100,000,000 tons of ore and Mr. Sellwood agreed that a new competitor would probably need to have that much. Mr. Sellwood was asked if he thought it practicable to attempt to buy out existing companies having manufacturing plants so as to acquire their ores. He replied that of course this could be done if any one wanted to pay the price.

The declining iron content of the ores of the United States came up for consideration. Mr. Sellwood thought the decrease had been about 1 per cent. in the past four or five years. He admitted that it might have amounted to 7 per cent. since the Mesaba Range was opened. This tendency would continue, he thought, but perhaps not as rapidly as in the past 20 years. In, say, 25 years, it might pay to ship Utah ores to the East for smelting.

MR. YOUNG. Mr. Sellwood, I understood you to say, in answer to one of the chairman's questions, that you did not know any good business reason why the Steel Corporation should take this Hill lease when it had these large bodies of ore that were stripped and ready to ship. I understood you to say just a little before that, in answer to a question by Mr. Gardner, that you thought that a company with so extensive plants as the Steel Corporation ought to get more ore than 500,000,000 tons, or 25 years' supply?

MR. SELLWOOD. Yes.

MR. YOUNG. Now, which proposition do you stick to?

MR. SELLWOOD. Well, I stick to the proposition that they should get all the ore they could get at a reasonable price. I think that was the proposition that I made.

MR. YOUNG. You think the price was unreasonable?

MR. SELLWOOD. I do, where it continued along, increasing every year, for some of the property. For other of the property, such as the Dale and Leonard and two or three other properties that were opened, I said I would be glad to give $1 a ton for it and offered to do it. But when you take in a great big proposition, where the ore is good, bad and indifferent, and the royalty and the minimum increasing every year, I do not see why that should be done.

THE CHAIRMAN. If they could have gotten a lease on that property at 25 cents a ton and taken out 500,000 tons a year, it would be a very good proposition?

MR. SELLWOOD. Yes.

Central Iron & Steel Company Statement

J. V. W. Reynders, J. M. Cameron and Charles L. Bailey, Jr., receivers of the Central Iron & Steel Company, Harrisburg, Pa., have made a preliminary report to the creditors under date of April 12. It says that a number of important contracts are being carried out, that the plant has been put in the best possible shape by cutting down cost of operation and by other economies.

A condensed statement of the assets and liabilities of the company as of February 6, 1912, is given. It shows total current assets of $949,440, including $251,292 of bills and accounts receivable considered good, $660,037 of inventories and $60,000 estimated value of Mohawk Mining Company (Lake Superior iron ore) stock, estimated value over amount of loan of $140,000. Real estate buildings and equipment are put at $2,684,128, and machinery parts in reserve at $51,236. Total assets are thus $3,684,804. The liabilities are $2,899,823 including $1,239,000 first mortgage bonds, $15,000 car trust bonds, $671,952 accounts and bills payable for merchandise, $510,975 loans from banks and others, $422,305 loan accounts (Edward Bailey and others) $12,297 accrued taxes and bond interest, $21,853 wages and salaries, and $6,438 accrued interest on loans. The excess of assets is $784,981. No account is taken in the schedule of assets of an item listed by the auditors as "accounts receivable for advances considered doubtful of collection," amounting to $873,391.

The New England Foundrymen's Association

An Address on Fire Protection

The monthly meeting of the New England Foundrymen's Association was held on the evening of April 10 at the rooms of the Exchange Club, Boston, Mass. Members were in attendance from all the New England States. An address was delivered by Franklin H. Wentworth, secretary National Fire Protection Association, who stated that as long as wooden cities stand disastrous fires with shocking losses of life are bound to occur. He claimed that the fire loss amounts to $30,000 every hour in the 24 each day throughout the year. Following are some extracts from his address:

Last year the legislatures of New York and Illinois undertook an investigation of the methods and practices of the fire insurance business. This procedure found its impulse in hostility toward the fire underwriting interests; but both of these investigations developed the fact that scientific or satisfactory underwriting is impossible, and will continue to be impossible, until the criminally careless fire waste of the country is curtailed. It is obvious that these investigations and the one now under way in Wisconsin represent an incoherent protest against the frightful impoverishment by the fire tax. The people feel that the fire tax is too high. Everybody knows that it is too high. But how can the fire tax be lessened except by attacking the cause of it?

There is one way to solve this conflagration problem—not absolutely, but at least relatively. In the heart of nearly every city there are streets crossing at right angles, along which for a very considerable distance are buildings of brick, stone and concrete. Looked at upon the map this shows a more or less complete Maltese cross of buildings which are not wooden, and which operate to divide the wooden-built district into quarter sections, and which might hold a fire in any one of these sections if they were equipped to do so. These brick and stone buildings are ordinarily valueless as fire-stops because their windows are of thin glass and their window frames of wood. The small city that will trace but its Maltese cross of such buildings and equip them with metal window frames and wired glass will immediately possess the equivalent of substantial fire walls crossing at right angles in its center, dividing it into four sections. By such a simple, inexpensive, but yet strategic procedure many a city may save itself from the destruction which now awaits only the right kind of a fire on the right kind of a night.

Having thus fortified city buildings one against the other, extensive fires within individual structures can be prevented by the use of the now well established automatic sprinkler system. With our window openings protected and our buildings equipped with such extinguishers, the conflagration hazard in mercantile districts will be eliminated. There will then remain for consideration our immense residence districts constructed almost wholly of wood surrounding the mercantile centers, like fagots around a funeral pyre. We can lessen the loss here by the abolition of the use of wooden shingles. Burning shingles can be carried great distances by the wind or draft of a conflagration, and when they alight in their turn upon other dry shingles they make fearful havoc. It will not be necessary to remove all shingle roofs immediately. An effective city ordinance might require all roofs constructed in the future to be of incombustible material, and that all roofs which shall hereafter require repair to the extent of one-third of their area shall be replaced with incombustible roofs.

In outlining the work of his association Mr. Wentworth said that the record of 15 years, covering more than 10,000 fires under automatic sprinklers, failed to show a single instance where these sprinklers had not properly taken care of putting out a fire or of holding it in check unless they were handicapped by having been tampered with or by not being of standard and approved construction and layout.

Announcement was made that next month's meeting of the association will be held in the Allen House, Hartford, Conn. A statement was also made of progress by the State of Massachusetts in connection with a bill regulating the employment of girls and women in coremaking rooms. This matter is being referred to the State Board of Health for attention.

The American Railway Supply Company has removed from 24 Park place to its new factory building, 134-136 Charles street, New York.

Government Inquiry Into Steel Works Labor Conditions

The Bureau of Labor of the Department of Commerce and Labor has for some weeks been carrying on a supplementary canvass of the iron and steel industry with a view to securing information for the final report to the Senate on conditions of labor in that industry in conformity with Senate resolution No. 237. Iron and steel manufacturers have been asked the following questions:

1. Has the plan proposed by the American Iron and Steel Institute for the elimination of seven-day work for individual employees been put into effect in this plant?

2. Has any other plan for the elimination of seven-day work for individual employees been put into effect?

a. If so, please furnish a description, with diagrams, of the plan used, showing particularly how the change of shift is managed.

3. If any plan for the elimination of seven-day work has been introduced:

a. When was it put into operation?

b. What was the normal proportion of men working seven days in each department, before the plan was put into operation?

c. What is the normal proportion of men working seven days in each department now?

d. How many extra men (relief men) does the operation of the plan require when the plant is running full?

e. What changes in tonnage or hourly rates of wages were made as a result of the introduction of this plan?

f. What changes in cost of production have followed the introduction of the plan?

g. What has been the attitude of the workmen toward the introduction of the plan?

4. What permanent changes have been made in the past year in the working hours of employees other than those working seven days per week?

a. Changes in hours per day?
In what occupations?
Affecting how many men?

b. Changes in hours per week?
In what occupations?
Affecting how many men?

5. What improvements in sanitation and general physical conditions have been made in the past year?

Lackawanna Steel Company's Quarterly Earnings

The Lackawanna Steel Company and subsidiary companies report as follows for the quarter ended March 30:

	1912	Changes	
Income from manufacturing and operating after deducting all expenses, interest on bonds and fixed charges of subsidiary companies	$112,439	Dec.	$507,634
Proportion of earnings on investments in companies not controlled and of other annual income	199,964	Inc.	30,195
Total	$312,403	Dec.	$477,435
Interest on Lackawanna Steel bonds and debentures outstanding	437,495	Dec.	4
Deficit	$125,091	Inc.	$477,431
Charges and appropriations for sinking funds on bonds and exhaustion of minerals	89,500	Inc.	35,090
Depreciation and accruing renewals	236,180	Dec.	26,019
Total deductions	$325,680	Inc.	$9,070
Deficit	$450,772	Inc.	$486,501
Unfilled orders, gross tons	401,475	Inc.	156,914

The unfilled orders are the largest since March 31, 1910. On April 1 the company had accounts receivable of $4,580,835, cash on hand of $3,884,422 and current liabilities of $925,713.

The April 1 market circular of James Lewis & Son, Liverpool, England, refers to the strong statistical position of copper. Figures are given showing the great increase in the consumption of copper in Europe and the United States in the first two months of this year, and the circular remarks that "with an increase in the American consumption of 11,596 tons, or at the rate of 70,000 tons per annum, the total increase of production of about 150,000 tons will be required to maintain American and European stocks at the low level attained on January 1, should this increased consumption be maintained throughout the year in the same ratio."

The Machinery Markets

Activity in demands for machinery is not general throughout the country, but in some sections the conditions are of a pleasing character. The Chicago trade is greatly encouraged by a $100,000 inquiry and some good sales, including buying by railroads and the automobile industry. New York has not experienced any noteworthy change in the week, several good prospects continuing to pend and causing expectations to be of a hopeful sort. Philadelphia's recent betterment has somewhat subsided, but there is a considerable amount of business under negotiation in that city. New England conditions which have improved recently show no change. The Cleveland outlook is promising, although present conditions are quiet, especially in the machine tool industry, which has been called on to supply one or two tools at a time chiefly. The machine tool business in Cincinnati has been fairly good, with a falling off in exports. Other lines are busy. Fair purchases were made by automobile makers in Detroit, although the trade has been irregular and the best demand was for special lines. In St. Louis trade has been fairly good, but with no business out of the ordinary. Calls for equipment have been more quiet in the South, where there is some complaint of price cutting, and where a betterment is expected with construction work soon to be undertaken. Purchases of wood working machinery and some special lines have been the principal features on the Pacific coast. In Texas the demand for machinery and tools continues good and dealers are well satisfied with trade conditions.

New York

NEW YORK, April 17, 1912.

Machinery dealers in New York have done fairly well in the last week although there has been a continuance of quiet conditions. Sales have been almost entirely of the small lot variety for shipment to scattered points. Some good prospects still hang fire, notably the Safety Car Heating & Lighting Company, of Jersey City, N. J. On the other hand at least some orders against the big list of the Delaware & Hudson Company are as good as placed. New York dealers are looking to an extension of facilities in the plant of the Standard Roller Bearing Company, Philadelphia, which contemplates in particular the replacement of engine lathes with turret lathes and automatics. Other equipment probably will be purchased as well. The American Can Company is again in the market for a few tools. From Newark comes the news that the Oxweld Acetylene Company has obtained a permit for the erection of a three story brick and concrete factory at 646 Frelinghuysen avenue, to cost $66,800. Through the efforts of the Greater Newark Committee it is expected that the Hatch Oil Engine Company, of Brooklyn, and the Ariston Marble Company, of New York, will locate in Newark. Perhaps the most notable feature of the New York market is the talk of plant additions and removals, some of which are outside of the New York territory, and all are without official confirmation. The Hall Signal Company is expected to extend its line of production and will necessarily need additional facilities. With this end in view steps have been taken for a reorganization of the company and the acquisition of additional capital.

The Philo-Hay Specialty Company, Newark, N. J., has awarded a contract to the American Concrete Steel Company for the erection of a new factory building, 37 x 175 ft., three stories, of reinforced concrete construction. Equipment details have not been announced.

The Salamanca Panel Company, Salamanca, N. Y., has been incorporated with $50,000 capital stock to take over the business of the Salamanca Veneer & Panel Company. The plant is practically new and will need but few alterations or additions to its equipment. The incorporators are E. R. Morrison, P. Z. Morrison and T. McCabe.

The Utter Pipe Company, Olean, N. Y., manufacturers of tobacco pipes, has placed the contract for the erection of its new factory building to be added to its plant. Upon completion the company will have 22,000 sq. ft. of manufacturing space and considerable additional machinery will be required.

The city of Newark, N. Y., is receiving bids until April 30 for a sanitary sewage system including a sewage disposal plant consisting of two Imhof tanks to be operated by electric pumps and automatic machinery. J. E. Wiser is city clerk.

The Aetna Wright Health Underwear Company, Troy, N. Y., will soon award the contract for the erection of a four-story addition to its knitting mill.

The Control Mfg. Company, Albany, N. Y., has been incorporated by William J. Kerwin, 337 State street, Edward T. Newcomb and Joseph P. Coughlin, with a capital stock of $100,000, and will engage in the manufacture of metal castings.

The Deyo-Macey Engine Company, Binghamton, N. Y., will construct a new plant on the site of the old roundhouse and repair shops of the Delaware & Hudson Company, which it has leased for a long term. The old buildings will be torn down and the material utilized in the construction of the new plant.

The Village Board, Middleport, N. Y., will receive bids until April 24 for construction of a waterworks system, including pumping station, pump equipment, standpipe, etc.; also about 8 miles of cast iron pipe.

The Tri-Town Electric Company, Glenville, N. Y., has been incorporated and will equip a power plant to furnish electric power and lighting in Glenville, Clifton Park and Ballston; also other nearby villages. W. A. Graves, Michael J. Hughes and Samuel M. Strong are among the directors.

Hubbard Miller & Eldridge, Rochester, N. Y., are building an addition 32 x 120 ft., five stories and basement of brick and structural steel, to their factory at Dewey street and Lyell avenue.

William E. Harries, Superintendent of State Reservation, Niagara Falls, N. Y., is receiving bids for ventilating apparatus for shaft and tunnel at the State Reservation.

The Niagara Brass Mfg. Company, Buffalo, N. Y., has secured the three-story brick factory building at 163-165 Adams street, to which it will remove its plant from 59, The Terrace, after fitting it up and equipping it for brass stamping and finishing and the manufacture of brass screws.

The Buffalo Tool & Supply Company, Buffalo, is building a small addition to its plant on Henry street.

The Electric City Mfg. Company, Buffalo, now located at 60 Cherry street, has taken a three-story brick factory building on Adams, near William street, which it will equip for general stamping business in sheet metals.

The Waterworks Commissioners, Erie, Pa., George C. Gensheimer, secretary, are receiving bids for the construction of a filter plant, including settling basins, piping, coagulent house and superstructure, pumping station, low service pumping machinery, water-tube boilers, stokers, and superheaters. The plans have been prepared by Chester & Fleming, engineers, Union Bank Building, Pittsburgh.

The Erie Saw Company, Erie, Pa., has been incorporated with a capital stock of $10,000 and will equip a plant for the manufacture of saws and tools for butchers' and grocers' use. W. C. Kreamer, Neilsen and Louis Streuber are the directors.

New England

BOSTON, MASS., April 16, 1912.

The sentiment of the market has not changed from its position of recent weeks. Both dealers and manufacturers in most lines of machinery and supplies express confidence that the improved market is more than a transitory one. Orders are coming from a more widely diversified trade.

The United Foundry & Machine Company, Bridgeport, Conn., recently incorporated with $200,000 capital stock for the manufacture of brass, bronze and aluminum castings and to do a machine shop business, has purchased land on Connecticut avenue, in that city, and will erect a plant consisting of two buildings, each 50 x 120 ft. One unit will be devoted to the manufacture of brass and bronze castings, the other for the exclusive

purpose of casting aluminum. The equipment will include a modern machine shop. William C. Buckelew, Bridgeport, is the president, Philip D. Beach, Bridgeport, secretary, and Andrew Steen, New York, treasurer. The other directors are Frederick L. Buckelew, Bridgeport, and George A. Helme, New York. President Buckelew was formerly president of the Fairfield Aluminum Foundry Corporation, which recently disposed of its business to the Aluminum Castings Company, Cleveland, Ohio. The company is in the market for the regular foundry equipment, but not as yet for supplies.

The Worcester Auto-Parts Company, Worcester, Mass., has been organized to manufacture the H-C-D piston ring, the production of which will be carried on at the works of the Heald Machine Company, of that city. J. N. Heald is the president and treasurer, C. N. Cowan general manager and J. A. Doane mechanical engineer. The Heald piston ring grinder will be used by the company. Rings will be furnished for automobile, motorcycle and marine engines, aero motors, pumps, compressors and traction and stationary engines.

The Connecticut Turbine Mfg. Company, 81 Hamilton street, New London, Conn., will manufacture a new steam turbine of the auxiliary type, suitable for direct connection with electric generators, centrifugal pumps and blowers. It was designed by Charles B. Rearick, until recently of the Atwood, Rearick Company, New York, which handled the Kerr turbine. The engine is the result of some months of development, the purpose being to meet the requirements of low speed and high efficiency. The active member of the new corporation is William T. Hopson, who for years has been actively interested in the Hopson & Chapin Mfg. Company, New London, an old and well-known house with an established reputation for high grade foundry work. The headquarters will be the Hopson & Chapin plant, where the turbine will be manufactured. New London business men have interested themselves in the industry, and the president and board of directors are taken from their number. Thomas Hamilton is the president, Charles B. Rearick vice-president and manager and William T. Hopson secretary and treasurer.

Andrew C. Campbell, Waterbury, Conn., is establishing a business for the manufacture of a new cotter pin, a patent for which has been issued to him. A tract of land has been purchased and a factory building will be erected on the premises. Mr. Campbell is well known as a designer of automatic and other metal working machinery and has designed several machines for the manufacture of the cotter pin, which should be ready in a few weeks. In the beginning he will occupy only a part of his building, renting the remainder to small industries. The feature of the cotter pin is an automatic spreader. After the pin has been inserted in its hole a hammer blow on its head causes it to spread. The head is in the form of an eyelet of bent wire. The blow drives one limb past a projecting tip on the other limb which is a trifle longer. The spreading is slight but sufficient.

The G. E. Prentice Mfg. Company, New Britain, Conn., has been organized to manufacture a line of novelties in sheet metal and wire, particularly metal trimming for suspenders, garters and armbands. It is a Connecticut corporation and will commence business with $25,000 capital stock. The incorporators are G. E. Prentice, F. H. Johnston and F. H. Alford, all of New Britain.

The Easthampton Gas Company, Easthampton, Mass., has petitioned the Massachusetts Gas & Electric Light Commission for permission to increase its capital stock by $100,000, the proceeds to be used for new equipment.

The Gaynor & Mitchell Mfg. Company, Bridgeport, Conn., states that it has not completed plans for the new plant which will be erected at Stratford, Conn. The company does a brass foundry business.

It is stated authoritatively that the New York, New Haven & Hartford Railroad will proceed with the electrification of its main line from Stamford to New Haven, with the intention of completing the improvement before the end of the year. The estimated cost is $14,000,000.

The sale of the plants and other assets of the Hardware & Woodenware Company, which was made at Worcester, Mass., a few weeks ago, under order of the United States Court, has been set aside by the court on the ground that the price paid for bills receivable and other assets was insufficient. The purchaser was R. B. Sentress, Baltimore, Md., representing a syndicate of that city. His bid was $410,000. Court has ordered that another sale be held and that each bidder shall place with the Court $40,000, as a pledge of good faith, and that no offer of less than $440,000 shall be considered as the opening bid. Albert A. Tisdale, Leominster, Mass., formerly owner of the company's factory in that town, has made the required deposit as representative of a combination of former managers of the individual plants. The date of the sale has not been set.

A contract for the new buildings to be erected by the New Britain Machine Company, New Britain, Conn., has been awarded. The plans include a four-story brick building, 57 x 150 ft., with an ell 38 x 56 ft.; a one-story building 38 x 70 ft., and three additional stories on an existing one-story building, 57 x 144 ft. All will be of brick, mill construction.

A message by Governor Eugene F. Foss of Massachusetts, the head of the B. F. Sturtevant Company, Hyde Park, concerning the lease of the Boston & Maine Railroad to the New York, New Haven & Hartford has attracted much attention. In it he recommends the wisdom of such a step on the condition that the company shall agree to expend $100,000,000 for the connection of the tracks on the north and south of Boston by means of a four-track tunnel under the city; for the electrification of the combined trackage within the metropolitan area, and for bringing the whole system to the highest state of efficiency. He would vest the direction of the expenditure of the $100,000,000 in a public service commission created by the Legislature.

The American Brass Company, Waterbury, Conn., will erect three buildings as additions to the Waterbury Brass Company property. One will be 42 x 152 ft., four stories; another 42 x 57 ft., three stories, and the third 42 x 50 ft., one story. They will be of brick, mill construction, with steel columns.

It is stated at Bridgeport that the Crane Valve Company, of that city, has tentative plans for the erection of three new buildings, two and three stories, each about 100 x 150 ft.

Philadelphia

PHILADELPHIA, PA., April 16, 1912.

The recent betterment in machine tool buying does not appear to have been fully sustained the past week. Hesitancy in placing business is again more noticeable, prospective buyers apparently waiting for further evidence of the soundness of the recent improvement in the iron and steel market, as well as in industrial affairs. Quite a large volume of business in small lots is under negotiation and a few fair-sized propositions in general equipment are noted; but buyers are either not yet prepared to make purchases, or proposed improvements and new plants have been delayed. Unfavorable weather conditions have been the cause of considerable delay in building operations.

Manufacturers of machinery and general equipment, drawing business from other markets as well as from this immediate territory, are, in some instances, slightly better engaged, although still largely below normal. The local locomotive builder has taken on a number of small contracts. Shipyards in this vicinity have received further contracts for vessels, while iron and steel mills are considerably better engaged. The demand for machine tools on the part of the railroads continues very light.

A moderate volume of business is moving in power equipment. Boilers and engines inquired for have been largely of the smaller horse-powers, although one or more for general power plant equipment are under negotiation.

The second-hand machinery markets have not been very active; an irregular day-to-day demand is reported, confined to no particular class of equipment.

Gray iron foundries have in instances shown a trifle more activity. Steel casting plants do not show much further gain, but have more work on their books; while crucible steel casting makers are for the most part quite well engaged.

The Pennsylvania Equipment Company, West End Trust Building, is in the market for an air compressor, 5000 to 6000 cu. ft. capacity, 100 lb. pressure; also four 200-hp. Babcock & Wilcox boilers and a steel building, approximately 70 x 250 ft.

The Light Mfg. Company, Pottstown, Pa., advises that immediately on the vacation of the buildings now occupied by the Chadwick Engineering Company, which will move to its new plant, it will begin the preparation of that plant as well as the erection of additional buildings for the proposed extension to its plant, which has been in contemplation for the past 18 months. The new additions will require the doubling of the present

equipment in its foundry, die casting and machine shop departments. The company expects to get the new addition inoperation in six or eight months.

The Atwater-Kent Mfg. Company has taken out permits for the erection of its new manufacturing plant at 4936 Stenton avenue. The building is to be 120 x 160 ft. of brick and concrete.

A five-story manufacturing and warehouse building is being designed, it is reported, by Louis Levis, to be erected for Kahn & Greenburg, at 2043 and 2045 Arch street, to be occupied under a long lease by the National Casket Company. The building will be 40 x 140 ft. Particulars are not yet available.

The Standard Chain Company, York, Pa., is building an addition to its plant consisting of two buildings, one 70 x 240 ft.; the other 85 x 240 ft. The buildings will be equipped with machinery for the electric welding of chain, which will be largely manufactured in its own shops.

The Herr Automatic Press Company, Ambler, Pa., is exceedingly busy in all departments. It has recently shipped two carloads of automatic machinery to the plant of the Farmers Feed Company, New York, including a number of hydraulic presses, pressure sustainers and complete automatic machinery equipment.

George C. Boldt, Bellevue-Stratford Hotel, has, it is stated, commissioned Hewitt, Granger & Paiste to plan a four-story garage, 102 x 150 ft., to be erected on properties 1401 to 1409 Locust street. The building is to be fireproof and contain all modern conveniences for garage purposes.

The Yardley Mfg. Company, Yardley, Pa., has been incorporated with a capital stock of $25,000 and will engage in the manufacture of machinery for mixing seed. A plant has been acquired and will probably be equipped in the near future. Stephen B. Twining, Yardley, Pa.; Howard C. Matlack, Philadelphia, Pa.; Calvin S. Boyer, Doylestown, Pa., and Mary W. Twining are named as incorporators.

A public hearing on an application by the Philadelphia & Reading Railway to widen one of its Port Richmond piers will be held at an early date by the Board of Port Wardens. The company proposes to widen its Pier 18 from 40 to 70 ft. and to extend it to 700 ft. and to erect thereon modern improved facilities for the handling of coal. The proposed improvement will cost something like $500,000.

J. G. Speidel, Reading, Pa., continues to operate the plant at practically full capacity. Some good contracts for elevators and hoists have been booked. Recent deliveries include a 3000-lb. special elevator winding machine, electrically driven by an alternating three-phase motor for W. H. Luden, Reading Pa.; a two-ton electric winding machine for the Hamburg Broom Works, Hamburg, Pa.; a four-ton double I-beam hoist for the Tampa Foundry & Machine Company Tampa, Fla.; a four-ton single I-beam crane has been furnished F. J. Hart, Honeoye Falls, while a three-ton crane of the same type has been shipped the Hattiesburg Wood Reduction Company, Hattiesburg, Miss. Winding machines have also been furnished the Atlas Tack Company, Fairhaven, Mass.; J. H. Knoll, Reading, Pa., and Heckle & Kellog, Cape Charles, Va.

The Harlan & Hollingsworth Corporation, Wilmington, Del., has awarded a contract to the McClintick-Marshall Construction Company for four new steel buildings, including what will be known as the west mill, car shop and office building. Work is to be started at an early date.

W. S. Hewitt, architect, is understood to be drawing plans for a number of buildings, which will be erected for the Ingram Wheel Company at Egg Harbor, N. J. The proposed buildings are each to be one and two stories, 50 x 250 ft., of brick and concrete construction.

Articles of incorporation have been filed by the Home Mfg. & Light Company, Elkton, Md., with a capital stock of $50,000 to manufacture and supply electric power in that city and vicinity. William S. Evans, W. Stirling Evans, Edward Deibert, Elmore Deibert and James F. Powers are named as incorporators.

The contract for the new foundry plant for Bureau Brothers, bronze founders, to be erected at Twenty-third and Westmoreland streets, has, it is stated, been awarded to William R. Dougherty, who will begin the work of erection at once.

The Baldwin Locomotive Works has been receiving a number of small orders for locomotives. One has recently been closed, in conjunction with the Westinghouse interests, for 24 large electric engines for the New York, New Haven & Hartford Railroad. Contrary to reports, no business for export has been entered. The company's plant is more fully engaged.

The Aberfoyle Mfg. Company, Chester, Pa., is changing the motive power at its plant from steam to individual electric motors. Altogether 160 motors of various sizes are being installed ranging from ¼ hp. to 50 hp., totaling 1000 hp., at a cost of about $40,000.

Chicago

CHICAGO, ILL., April 16, 1912.

Sales of machine tools in this territory the past week have been decidedly encouraging, and the outlook is made the more promising by reason of an unusually large volume of inquiry. A manufacturer of automobile parts at Milwaukee has been buying machinery, the total value of which purchases when completed will approximate $20,000. The County Traction Company mentioned a week ago has placed its order with a Chicago dealer, the value of the business aggregating over $6,000 and include a 42-in. x 16-ft. lathe, a 24-in. x 12-ft. lathe, a 16-in. back-geared shaper, a 2-ft. plain radial drill, all driven by variable speed motors. In Iowa territory sales reported include a 36-in x 20-ft. lathe, two 18-in. x 10-ft. lathes, a 12-in. gear hobber and two 14-in. x 6-ft. lathes. Other sales reported include two radial drills, one 3 ft. and one 3½ ft., a 16-in. x 8-ft. lathe, a 42-in. boring mill and a 60 x 48-in. x 14-ft. open side planer. The Chicago, Burlington & Quincy Railroad purchased several small tools and the Louisville & Nashville has a small inquiry in the market. A most important inquiry has just come out in the form of a request for quotations for nearly $100,000 of machine tools for the new plant of the Busch-Sulzer Bros.-Deisel Engine Company, St. Louis. It is announced that the machinery list for the Wabash Railroad will be closed today. An estimate has been made that in the various manufacturing suburbs south of Chicago inquiry is pending or about to be made for an aggregate of nearly $100,000 of machinery, and in one small city west of Chicago alone purchases are now being made and in prospect aggregating $25,000. The J. I. Case Threshing Machine Company, Racine, Wis., which is building a new tractor works, to have an estimated capacity for about eighty tractors a week, expects to be in the market for the machinery equipment in about three months.

The Myall-Wallace Company, an Illinois corporation, is equipping a metal treatment shop at 17 East Michigan street, Chicago, which it expects to have running by May 1, and will be pleased to receive prices on carbonizing materials, oil, etc. It will specialize in hardening, tempering, annealing and case hardening. The temporary address of the company is 449 The Rookery. P. J. Myall is president and W. A. Wallace, secretary and treasurer.

The Useful Specialties Company, Joliet, Ill., with $25,000 capital stock, has been organized by Robert Hohnbach, B. B. Forques and George W. Young to manufacture novelties.

The People's Water & Light Company., Harrisburg, Ill., has increased its capital from $50,000 to $75,000 for the purpose of increasing its mechanical equipment.

The Western Brick Company, Danville, Ill., has absorbed the Burlington brick plant at Aledo, and will remodel it. J. L. Buckley of Danville will be the general manager.

Sears, Roebuck & Co., Chicago, have had plans prepared and are about to begin the erection of a large addition to their plant. Service equipment will be required.

The Byam Tire & Rim Company, Chicago, has been organized, with a capital stock of $50,000, to manufacture wheel parts. The incorporators are William A. Byam, E. C. Byam and W. A. Scott.

The United States Radiator Corporation will add to its Edwardsville, Ill., foundry a new frame building 135 x 200 ft. New foundry and core room equipment will be installed.

The Vesta Accumulator Company, Chicago, has leased property 100 x 161 ft. at Indiana avenue and Twenty-first street, upon which it plans to erect as soon as possible a three-story building of mill construction to cost from $75,000 to $80,000.

The International Harvester Company, Chicago, has taken out a permit for the building of a foundry addition 15 x 62 ft., to cost $5,000.

Gustafson & Scott, Chicago, will build at 1655 Lowell avenue a machine shop 39 x 125 ft., one story, to cost $4,500.

The Miller-Schlosser Baking Company, Chicago, has purchased property 150 x 150 ft. on North Halsted

street, at a cost of $27,000, on which a $50,000 plant will be erected.

The Illinois Blower Company, Chicago, has changed its name to the Illinois Blower & Sheet Metal Company and has increased its capital stock from $5,000 to $10,000.

The Northern Brass Works, Waukegan, Ill., is preparing for the building of an addition to its present plant to provide facilities for added lines of manufacture.

The American Radiator Company is about to make additions to its Litchfield, Ill., plant consisting of a 25 x 245 addition to the foundry and 36 x 90 ft. to the core room.

The Union Electric Engineering Company, Chicago, has been organized, with a capital stock of $2,500, to manufacture electric motors and machinery. The incorporators are A. A. Worsely, W. P. Stuart and Hugo Krause.

Wolff Bros., Racine, Wis., have obtained a site at Joliet, Ill., upon which a shop will be built for metal pattern work. Brass and aluminum castings also will be made.

The International Hoist Company, Antigo, Wis., will begin work at once on the erection of two new buildings, a main building 40 x 80 ft. and a foundry 60 x 90 ft.

The Giddings & Lewis Mfg. Company, Fond du Lac, Wis., has increased its capital stock from $68,000 to $200,000, and will enlarge its plant to provide for the manufacture of pneumatic tools.

The Aluminum Castings Company, Manitowoc, Wis., is planning an addition to its plant to be 120 x 420 ft. A new power plant also will be installed.

The Hess Iron Works, Green Bay, Wis., has been incorporated with a capital stock of $25,000. The incorporators are William J. Hess, Oscar Zapfe and E. E. Brown.

The Fairbanks-Morse Company is about to add to its Beloit, Wis., plant an extension of the blacksmith shops 80 x 130 ft. Additions to the present foundry capacity are likewise contemplated.

The St. Paul Rim & Axle Company, St. Paul, Minn., has been organized to make automobile parts, particularly rims, axle and transmission parts and drop forgings. The company is seeking a plant site in that city and expects to build at once.

The A. E. Shorthill Steel & Iron Works, formerly of Marshalltown, Iowa, is erecting a new plant at Perry, Iowa, and will remove to that city.

Detroit

DETROIT, MICH., April 16, 1912.

Business in machine tool circles the past week has been somewhat irregular and buying was scattered. The sale of a fair list of tools to a local maker of motorcycles was reported and some small purchases were made by the automobile trade. A number of new concerns are negotiating for manufacturing quarters and it is understood that one or two are already making tentative inquiries for equipment. Electrical equipment is in good demand and some good business is being done in special machinery. Second-hand machinery dealers report a good volume of sales and inquiry for this class of equipment is keeping up remarkably well. Outdoor work has been considerably stimulated by the favorable weather lately and building permits for sizeable structures continue to increase. Increased demand in contractors' equipment has resulted. The market for wood-working tools is narrow. The only noticeable change in the foundry situation is a slight increase in bookings among the steel castings plants.

Contracts for the construction of the service building of the Detroit General Hospital, which is to be located at Grand and Hamilton Boulevards, have been awarded. The building will contain the power, lighting and heating plants for the hospital. The contracts for the equipment will be awarded later.

The Sewall Cushion Wheel Company, Detroit, at its annual meeting decided to increase its capital stock from $60,000 to $300,000 to extend its business. The company is contemplating building a new factory in this city in the near future.

The Imperial Bearing Company, Detroit, has taken out a permit for the erection of a one-story brick factory at Forest and Bellevue avenues to cost $4,500. The company's present location is 100 Iron street.

The Keeton Motor Car Company, Detroit, recently incorporated, is contemplating arrangements preparatory to the building of a manufacturing plant.

The Edmunds & Jones Mfg. Company, Detroit, maker of automobile lamps, has acquired the plant and business of Ireland & Matthews Mfg. Company, manufacturers of automobile and stove brass work. No change in the operation of the plant will be made at present.

The Tessmer Machine Company, Detroit, maker of special machinery, has awarded the contract for the erection of a two-story brick addition to its plant at Rivard and Mullett streets.

The Triumph Mfg. Company, Detroit, recently organized with $25,000 capital stock by Robert M. Brownson, Muir B. Duffield and George B. Sherman, for the manufacture of motorcycles, has acquired a factory building at 51-55 Woodbridge street East, and is installing equipment.

The National Silica Company, 1000 Union Trust Building, Detroit, has filed amended articles of incorporation increasing its capital stock from $75,000 to $200,000 and has also floated a bond issue of $100,000. The new financial arrangement will furnish larger working capital and will also provide for extensions to the company's plant and mechanical equipment. The plant of the company is at Raisinville, Mich.

The Detroit Roofing Tile Company, Detroit, has issued $50,000 in bonds, the proceeds of which will be used for extension and betterments to the company's plant and to provide for additional working capital.

The J. E. Bolles Iron & Wire Works will install sufficient new iron and wire-working machinery of special design in its plant to double its capacity. The company reports an excellent volume of business.

The Decroupet Iron Works, Detroit, has been incorporated with a capital stock of $25,000 to take over and carry on the business formerly conducted under the same style by Christopher Decroupet. No changes in the plant will be made at present.

The Wagenthals Motor Car Company, Detroit, recently organized, has completed plans for the erection of a factory for the manufacture of automobile delivery cars.

The Purdy Lumber & Mfg. Company, Detroit, has been incorporated with a capital stock of $25,000 to manufacture sash, doors and builders' supplies. The incorporators are: Norman and Charles W. Purdy and William A. Parker.

The Saranac Machine Company, St. Joseph, Mich., manufacturer of fruit package and special stapling machinery, has closed a contract with the Quaker Oats Company for capping and labeling equipment to the amount of $60,000. The company has outgrown its present quarters and is negotiating for a larger factory site in contemplation of doubling its facilities.

John S. Knapp, secretary of the Board of Poor Commissioners, Monroe, Mich., will receive bids until April 22 for the installation of an electric lighting system in the Monroe County Infirmary.

The Eldred Milling Company, Jackson, Mich., has had plans prepared for a new grain elevator 25 x 50 ft. of concrete and steel construction.

The plant of the Michigan Sugar Company, at Alma, Mich., is to be remodeled and enlarged at an outlay of $250,000. Among the more important additions to the equipment will be a set of batteries, an evaporator, a vacuum pan, eight fitter presses and a lime kiln. To provide for the additional power an addition to the present boiler house will be made and two new boilers installed.

The Johnston Construction Company, Battle Creek, Mich., has acquired the plant formerly occupied by the defunct Korn Krisp Company, and will fit it up as a steel drilling factory. The plant which the Johnston company vacated will be occupied by the Howard B. Sherman Mfg. Company. The last-named concern operates a foundry.

The Gibson Mandolin-Guitar Company, Kalamazoo, Mich., has acquired land and will construct a new factory. The building will be 60 x 125 ft., four stories and basement, and will be modernly equipped.

The Opportunity Mfg. Company, Saginaw, Mich., has increased its capital stock to $20,000 and will erect an addition to its plant which will double its capacity. The company will add the manufacture of caskets to its furniture line.

The Lake Shore Iron Works, Marquette, Mich., notes a material increase in business, both current bookings and inquiries involving future work showing a good gain. The plant is operating all its departments ten hours a day at present.

The taxpayers of St. Louis, Mich., will vote May 8 on a proposition to bond for $12,000 for waterworks extensions.

The Warne-Douglas Company has been organized

at Bronson, Mich., with $15,000 capital stock. The new company will manufacture sheet metal and hardware specialties and electric fixtures.

The handle plant of C. Wellman & Co., South Boardman, Mich., was completely destroyed by fire which caused a loss of $40,000. The plant will be rebuilt at once.

The Kalamazoo Vegetable Paper Company, Kalamazood, Mich., is adding a new line of paper to its products and will build a new plant 75 x 110 ft. to meet the increased demands of its business.

Cleveland

CLEVELAND, OHIO, April 16, 1912.

The past week has been quiet in the machine tool trade. Business with dealers so far this month has been somewhat lighter than during March. Sales have been confined almost entirely to single tools in smaller sizes, the business coming largely from small manufacturing plants and new concerns. Inquiries are not numerous and no new ones of any size have developed. The demand for second-hand tools is holding up quite well.

Reports from machine tool builders show that conditions in the trade are not uniform. Business with some is slowly improving but with others the improvement of a few weeks ago is not being maintained. There is a fair demand for power plant equipment for small installations.

Generally conditions among manufacturers in metal working lines show a satisfactory improvement over a few weeks ago and the outlook is regarded as promising. Plants engaged in the manufacture of automobile parts and accessories, in particular, are well filled with orders. Conditions in the foundry trade have improved and some plants are running at full capacity.

The Columbus Auto Brass Company, Columbus, Ohio, has let a contract for the erection of two-story factory building on North Fourth street.

The Ohio Boiler & Heater Company, Columbus, Ohio, has been incorporated with a capital stock of $30,000 by B. M. Buller, A. M. Richards and others.

The Saxon Mfg. Company, Toledo, Ohio, maker of automobile lamps and horns, will move from its present site to a five-story brick building on Cherry street, formerly occupied by the Dow-Snell Company. The new site will give the company five times its present floor space. The building will be remodeled and a sprinkler system installed.

The Grabler Mfg. Company, Cleveland, Ohio, will enlarge its plant by the erection of a four-story brick and steel building about 60 x 130 ft., to be used as a warehouse. Contract for the structure has been awarded.

The directors of the Cleveland Railway Company, Cleveland, Ohio, have authorized the erection of four power sub-stations, to cost $500,000, and the purchase of 220 new car motors.

J. W. Chrisford, director of public service, Lakewood, Ohio, will receive bids April 29 for erecting a steam water tower and water tank with a capacity of 500,000 gal. Plans are on file with C. W. Root, 1033 Society for Savings Building, Cleveland, Ohio.

The Chisholm & Moore Mfg. Company, Cleveland, Ohio, will occupy May 1 a new plant addition which will increase the capacity of its malleable iron foundry 60 per cent. Additional space amounting to 40,000 sq. ft. is provided for the foundry and 15,000 sq. ft. more space for the machine shop. Some new machinery will be installed.

The Universal Spring Hinge & Mfg. Company, Mansfield, Ohio, has been organized, with a capital stock of $15,000, to establish a plant for the manufacture of spring hinges and other products. The men most actively interested in the company are Calvin Keith and John M. Edmondson.

The Brown Clutch Company, Toledo, Ohio, is in the market for several lathes.

The Standard Oil Company is remodeling the power house of its No. 1 plant in Cleveland, and has placed orders with the Pennsylvania Boiler Company for three 200-hp. boilers, and with the Detroit Stoker Company for stokers of similar capacity.

The Fulton Pit Car Company, Canal Fulton, Ohio, is planning to move its plant to Massillon, Ohio, a proposition made by the company having been accepted by the Massillon Board of Trade. The city will purchase the plant of the Massillon Bridge & Structural Company, which will be vacated during the summer when the latter company has completed the erection of its new plant.

The Cleveland office of the Detroit Stoker Company has secured orders for three 275-hp. stokers for the new Marine National Bank Building, Buffalo, N. Y. Orders for three horizontal water-tube boilers of the same capacity have been placed with the Babcock & Wilcox Company.

The Western Automatic Machine Screw Company, Elyria, Ohio, is erecting a new boiler house. This company has placed orders with the D. Connelly Boiler Company, Cleveland, for two 175-hp. horizontal return tubular boilers, and has bought stokers of similar capacity from the Detroit Stoker Company.

The Dennis Motor Company, Toledo, Ohio, has been incorporated with a capital stock of $25,000 by H. H. Dennis and others. The new company has taken over the business of the Rambler Motor Sales Company of that city and will erect a salesroom and service station at Madison avenue and Fifteenth street.

The Wood & Spencer Engineering Company, Cleveland, has been incorporated with a capital stock of $50,000. This company is manufacturing electric light and power plants for country homes. Its offices are at 5606 Euclid avenue.

The Enterprise Enamel Works, Bellaire, Ohio, has awarded a contract for a 60 x 144-ft. addition to its plant, which will double its capacity.

A new plant with a building 15 x 50 ft. will be built at Bowling Green, Ohio, by the McMechen Preserving Company, Wheeling, W. Va.

The council of Salem, Ohio, is considering the issue of $25,000 in bonds to build an electric light plant According to the plant furnished by the Bailey Engineering Company, Alliance, Ohio, it is estimated that the cost of the equipment of the proposed plant will be $19,000.

The Village Council of Hubbard, Ohio, has rejected bids for pumps for a $30,000 water-works system and will readvertise.

Cincinnati

CINCINNATI, OHIO, April 16, 1912.

There is a peristently circulated report that one of the larger automobile and truck manufacturing companies in the Detroit district is contemplating moving its plant to Cincinnati. It is also known that a New York auto truck builder has been looking over the ground here, and it is not improbable that it will select a factory site at an early date.

The machine tool business is fairly good, but export orders are not so numerous, especially from England, where the coal strike temporarily paralyzed manufacturing activities.

Boiler makers are busy on tank work, and there is a fair demand for the smaller units of power plant equipment.

The Hess Spring & Axle Company, Cincinnati, has decided to make an additional extension to its Carthage plant, contract for which has been let to the J. B. Stevens Company, Cincinnati.

Considerable structural material will be required for an eight-story building to be erected on Main street, Cincinnati, for the Avery estate. The Roche-Bruner Company, Johnston Building, have the work in charge.

The Buckeye Aluminum Company, formerly located at Doylestown, Ohio, has moved to Wooster. The company lately increased its capital stock from $100,000 to $150,000.

On May 6 C. W. Handman, business manager of the Board of Education, Cincinnati, will open bids for boilers and other heating equipment for two large school buildings. Garber & Woodward, Andrews Building, Cincinnati, drew up the plans for the buildings.

The Union Gas & Electric Company, Cincinnati, has taken out a permit for erecting a $20,000 distributing station at Myrtle and Preston avenues.

A large addition is planned for the new plant of the Victor Safe & Lock Company, Norwood, Ohio, for which considerable mechanical equipment will doubtless be required. Building plans have not yet been worked out.

The Logan Carriage & Automobile Company, Parkersburg, W. Va., has been incorporated with $25,000 capital stock, to conduct a general repair shop. Thomas

Page and B. F. Stout are named among the incorporators.

The Allyn Engineering Company, Second National Bank Building, Cincinnati, has been awarded the contract for the large proposed plant of the American Well & Prospecting Company, to be erected at Columbus, Ohio.

A large addition is planned to the plant of the Lauth-Juergens Motor Car Company, Fremont, Ohio. The Allyn Engineering Company, Cincinnati, has the plans in charge.

The Jeffrey Mfg. Company, Columbus, Ohio, reports a substantial increase in orders for its mining, conveying and elevating machinery, one department having enough orders booked to keep it active for several months ahead.

The Brightman Mfg. Company, Columbus, Ohio, is working on a large order from Buenos Aires, Argentina, for special shafting straightening machinery.

The Baltimore & Ohio Railroad Company has acquired a large site at Martinsburg, W. Va., on which it will construct an immense creosoting plant for treating crossties.

The South

LOUISVILLE, KY., April 16, 1912.

Although weather conditions have improved greatly and the flood situation along the Mississippi is less acute, business has not responded as rapidly to the betterment in physical conditions as had been expected. The demand for equipment is rather quiet, and there is complaint from manufacturers that prices are being cut to such an extent that successful bidders for machinery contracts have only a narrow margin of possible profit. There is an unusual amount of building of importance in prospect in this immediate territory, and this is certain to afford an outlet for considerable machinery in connection with contractors' equipment, power and heating plants, etc. In Louisville alone the outlook is for a record-breaking amount of construction work this year. Public service concerns continue to promise a good deal of business.

J. W. Mann, who operates a planing mill at 1809 West Cedar street, Louisville, is planning a considerable enlargement of his plant. The machinery added will be motor driven. He recently installed a Fairbanks-Morse motor for the operation of one of his machines as a test of that form of power.

McDonald & Dodd, Louisville, are the architects in charge of the $300,000 Y. M. C. A. building for that city. Bids have been received for the erection of the structure and the installation of the elevators, but details as to other equipment will not be decided on for several months. A heating plant will be installed and possibly a light and power plant, although current may be purchased from a central station. The building is to be six stories of reinforced concrete construction.

B. F. Meek & Sons, Louisville, manufacturers of fishing reels, have moved into their new factory at 1430 South Eighteenth street. The capacity of the plant has been doubled, several lathes of the Stark Tool Company, at Boston, having been installed. A polishing machine will be secured later. Most of the special machinery is made in the company's own shops. William Carter is secretary and treasurer of the concern.

The Henry Vogt Machine Company, Louisville, has sold two 250-hp. water-tube boilers to the Merchants' Ice Company, Terre Haute, Ind., and a 15-ton ice plant to the Leingruber Company, London, Ohio, a new concern. Business is fair with the company, but prospects for additional ice machinery business are not particularly bright.

The Frederick-Ruggles Mfg. Company, 210 West Main street, Louisville, is considering making some improvements, the exact nature of which has not been detailed. The company makes automatic measuring devices.

E. D. Morton & Co., Louisville, machinery dealers, have been appointed agents for the Vixen Tool Company of Philadelphia.

It is stated that the Dix River Power Company, which was organized last week with $3,000,000 capital stock for the purpose of developing electrical water power on Dix River in Garrard County, Ky., near Lancaster, will proceed with the construction of its plant in the near future. Arthur Giesler of New York has been engaged as engineer, it is announced. L. B. Herrington, Richmond, Ky., president of the company, heads the Richmond Lighting Company. It is planned to supply current not only to the towns in the immediate vicinity, but also to Lexington, Louisville and Cincinnati.

The Somerset Milling Company, Somerset, Ky., will be in the market shortly for motors for the operation of its machinery, as it is planning to substitute electric current for other power in the operation of its flour mill.

The merger of two Evansville, Ind., public service corporations is expected to result in a big improvement in the plants of the companies. The concerns affected are the Evansville and Southern Indiana Traction Company and the Evansville Public Service Company. Charles Murdock, Lafayette, Ind., is president of the combined organization.

The Dean Coal Company, Knoxville, Tenn., has been organized with $25,000 capital stock for the development of a coal tract near Barbourville, Ky. A coal mining plant providing a production of 500 tons a day is now being installed. H. W. Smith, H. W. Sanford and M. R. Campbell, Knoxville, are the incorporators.

The Price-Evans Foundry Company, Chattanooga, Tenn., is to build a plant for the manufacture of ornamental iron. Plans for the building are now being drawn.

The Economy Bag Closing Company, Knoxville, Tenn., has been organized with $10,000 capital stock to manufacture a patented machine for bag-sewing purposes. J. E. Miller and J. Allen Smith are the incorporators.

A. Kleitz and others, Chicago, have asked the city of Chattanooga, Tenn., to create a franchise for the manufacture, distribution and sale of gas. They plan the erection of a large plant.

The Duck River Power Company, Shelbyville, Tenn., which recently increased its capital stock to $100,000, plans to push work this summer on the construction of its water power projects on Duck River, part of which has been begun. The cost of the plants will be $100,000. J. F. Boyd is president of the company.

The Southern Mercantile Company, Memphis, Tenn., has been incorporated with $100,000 capital stock for the manufacture of furniture, specializing in a kitchen cabinet of new design. W. K. Burton, Memphis; H. W. German, Ft. Worth, Tex.; H. A. Sorrells, Columbus, Miss., and others are the incorporators. A large plant will be erected at once in the southern part of Memphis.

The Horine Development Company, which plans the construction of a large cement plant near Chattanooga, Tenn., at Marsh Station, will install a large rock-crushing plant immediately, carrying forward the other work later. The company also plans to manufacture fertilizer.

The First Street Ice Company, Knoxville, Tenn., has been incorporated with $25,000 capital stock by T. A. Wright, R. M. Jones, A. Rosenthal and others. A factory will be built.

J. E. Gibbs, White Bluff, Tenn., has purchased the stave mill of W. E. Cathey & Co. at Burns, and will secure additional machinery for the production of tight cooperage stock.

The Bessemer Soil Pipe Company, Bessemer, Ala., has increased its capital stock from $50,000 to $150,000.

The Delta Laundry, Greenwood, Miss., is in the market for a 50-hp. boiler.

The Marion Mfg. Company, Marion, N. C., is asking for prices on power equipment, including an engine and a boiler.

The Ingalls Iron Works Company, Birmingham, Ala., is to build an addition to its plant. R. I. Ingalls is president of the company and R. C. Roether construction engineer.

The T. O. Watkins Foundry Company has been organized at Hattiesburg, Miss., with $50,000 capital stock to take over the Watkins Machine & Foundry Company. T. O. Watkins, E. F. Rush and others are interested.

The Alabama Interstate Power Company, Montgomery, Ala., has announced that work on a water power plant on the Coosa River will be the first undertaken. It is intended to furnish power to Birmingham. Other developments will be undertaken on the Tallapoosa River. James Mitchell, president of the company, says that engineers are now making plans for the construction of the Coosa station near Wetumpka.

The city of Baxley, Ga., will receive bids through the City Council, May 3, for constructing reservoir and furnishing one boiler, one feed water heater, one duplex and boiler feed pump, one air compressor; for installing machinery complete, including switch board and for furnishing panel exciter, transformer and erection of a power house. W. W. Lyon, 305 Duval Building, Jacksonville, Fla., is consulting engineer.

Indianapolis

INDIANAPOLIS, IND., April 16, 1912.

The American Motors Company, Indianapolis, has taken out a permit for an additional three-story factory building of steel and concrete, the contract for which has been let to Hetherington & Berner, Indianapolis.

The Gem Mfg. Company has been incorporated, with a capital stock of $10,000, to manufacture furniture and woodenware. The directors are W. O. Hall, J. H. Johnson and F. B. Moreland.

The National Sign Mfg. Company, Indianapolis, has been incorporated, with $10,000 capital stock, to manufacture signs. The directors are William Bender, Jr., J. P. Goll and W. T. Carscadden.

The Hampton Mfg. Company, Indianapolis, has been incorporated to manufacture and deal in automobile accessories. The directors are S. B. Nussbaum, S. Allman and William Hampton.

The Hoosier Construction Company and the American Construction Company, both of Indianapolis, have been merged under the name of the Hoosier-American Construction Company. Daniel Foley is president.

The St. Joseph Heating Company, South Bend, Ind., has been incorporated, with $100,000 capital stock, as a public service corporation. The directors are F. A. Bryan, L. M. Chapin and C. A. Chapin.

The Central Indiana Steam Heating Company, Anderson, Ind., will rebuild its plant this year at a cost of $120,000. O. P. Crim is manager.

The National Mill Supply Company, Ft. Wayne, Ind., has increased its capital stock from $50,000 to $100,000.

The Manufacturers Plant & Power Company's property, formerly the factory of the Singer Sewing Machine Company, South Bend, Ind., has been acquired by the Engmann-Matthews Range Company, which has been reorganized, with Dr. George Knapp, Boston, president; William Happ, vice-president; Paul E. Wolter, secretary, and Harry A. Engmann, treasurer and general manager. There are 30 small manufacturing concerns in the building.

The City Council of Tipton, Ind., has voted a 25-year franchise to the Eastern Indiana Lighting Company for an artificial gas plant, to be ready for operation in October.

The Anderson Gas Company, Anderson, Ind., has let the contract for another unit to the United Gas Improvement Company of Philadelphia. The two units will make the output 1,500,000 cu. ft. of artificial gas a day.

The Board of Town Trustees of Petersburg, Ind., has voted a franchise to the newly-organized Petersburg Electric Light & Power Company. The franchise of the Petersburg Electric Light Company, now operating a system, expires in 1913.

The Standard Chain Company, Marion, Ind., will enlarge its plant with the addition of a new welding department 60 x 150 ft., into which new machinery will be installed.

St. Louis

ST. LOUIS, MO., April 15, 1912.

Transactions in machine tools continue to show a fairly satisfactory condition relatively considered and there are increasing purchases being made in the market, some of the inquiries showing an interest in a broad range of machinery. Large lists are not conspicuous, but there is a generally good feeling in the trade, while commercial and crop conditions in the St. Louis territory seem to presage a steady improvement from now on despite politics.

The machine shops of the Anheuser-Busch Brewing Association at St. Louis are to be reconstructed and considerable new equipment installed in replacement of present machinery.

The Automatic Register Company, organized by William P. Launtz, Paul W. Abt, East St. Louis; A. D. Branham, Virginia, and James Virdin, Dover, Del., is preparing for the erection of a large plant in East St. Louis for the manufacture of an automatic recording register for street and interurban cars. The mechanical experts of the company are W. H. Drake and J. W. Beeson. The headquarters are in the Metropolitan Building, East St. Louis. The capital stock is $1,000,000.

The Piasa Light & Power Company, a new concern, has been awarded the city contract for lighting Alton, Ill. Its organization is not yet public, but the representative of the company is C. M. Yager of Alton.

The Hanover Realty & Power Company, St. Louis, with $150,000 capital stock, has been incorporated by Henry V. Johnson, R. E. Matthews and C. A. Irons to equip a plant for the manufacture and sale of electricity for light and power.

The Illinois Central Railroad's repair shops at East St. Louis were burned last week with a loss of $75,000. They will be rebuilt and new mechanical equipment installed.

The Camden Copper Company, St. Louis, has been incorporated with $100,000 capital stock by Geo. M. Heath, M. H. Wolfe, E. V. Schoenfeld and B. Leopold to equip and operate property owned by the stockholders.

The General Fire Extinguisher Company, St. Louis, has been incorporated with $46,000 capital stock by O. C. Barber, G. G. Jordan, F. H. Maynard and Edw. Holbrook to establish a plant for the manufacture of fire extinguishers.

The Emmert Hardware & Cornice Company, East St. Louis, Ill., has been incorporated with $15,000 capital stock by W. T. Emmert, A. M. Emmert and Henry Warning to equip a plant for the manufacture of metal cornices.

The Valler-Spies Milling Company, St. Louis, which recently began the construction of a grain elevator in St. Louis, has purchased additional land near the elevator and is preparing plans for a large flouring mill of modern equipment.

Construction work was begun last week on the site of the Busch-Sulzer Bros.-Diesel Engine Company's manufacturing plant immediately upon the authorization thereof by the St. Louis municipal assembly. The construction cost will be $500,000. B. & J. Arnold, Chicago, are the engineer-contractors.

The Missouri Transmission Company, included in the syndicate which is building the Keokuk, Ia., hydro-electric plant, has finished the work of obtaining the necessary right of way through Missouri and will begin the transmission system construction at once. John H. Holliday of St. Louis is president.

The Missouri Valley Light & Power Company, Kansas City, Mo., with $250,000 capital stock, has been incorporated by R. G. Lafite, C. H. Smith and Otto McMahan to build and operate electric light and power plants.

The LaGrange State Safety Vault Company, LaGrange, Ill., with $25,000 capital stock, has been organized by J. E. Roberts, J. L. Roberts and Peter Weber and will build a safety vault at LaGrange.

The Illinois Glass Company, Alton, Ill., the largest hollow glassware factory in the world, has about completed plans for the rehabilitation of the plant involving new machinery and other equipment and construction to cost between $750,000 and $1,000,000.

The Western Cartridge Company has completed plans for the erection and equipment of a large plant on its property near East Alton.

The Standard Oil Company has under consideration plans for the increasing of its pumping capacity in its plant near Alton, Ill.

The Beall Bros. Shovel Company, Alton, Ill., has decided to expend about $10,000 for new machinery in its plant.

The Alton Brick Company, Alton, Ill., has improvements under way which involve in the ultimate expenditure of $250,000 for equipment and construction work.

The Purdy-Cooper Company's chair and its electric lighting plants at Malvern, Ark., have been purchased by the Berne Lumber Company, which is perfecting plans for the improvement of both plants in their mechanical equipment. The new machinery will embrace a large new generator.

The Pacific Coast

PORTLAND, ORE., April 9, 1912.

A fair volume of small single tool business is coming out, but inquiries for metal-working machinery of the heavier types are still very scarce, and delay in placing orders is the rule on all important projects. A few substantial orders for wood-working machinery are coming out from various parts of the north coast, but the movement in certain districts is greatly curtailed. The mills on Gray's Harbor are still seriously hampered by the strike, and the uncertainty of labor conditions tends to retard improvements in other districts, though the strike has not extended to any of the larger cities. Building operations are increasing, both here and at Seattle, but contractors require little new equipment. Considerable harbor work is projected at various points along the coast, for which some machinery may be required later. Special machinery for various manufac-

turing industries, as well as steam and electric power equipment, are in very fair demand.

D. G. Craig, district manager for the Beaver Company, manufacturer of Beaver Board, has been investigating conditions at Seattle, Wash., with a view to the establishment of a branch factory.

The Granby Consolidated Mining & Smelting Company expects to start work in May on a large smelting plant at Granby Bay, B. C., which will involve an investment of about $1,000,000.

The Oregon Fruit Cleaner Company, recently organized at The Dalles, Ore., proposes to install a factory at that place for the manufacture of a fruit cleaning and grading machine.

The Yakima Sash & Door Company, North Yakima, Wash., has been incorporated and plans to install a new factory at that place.

The Western School & Church Mfg. Company, recently organized by Idaho parties with a capital stock of $200,000, is planning to install a large furniture plant at Spokane, Wash.

The owners of the Colman Dock, Seattle, Wash., have placed an order for a large wharf crane, a duplicate of the one installed a year ago.

The town of Kalama, Wash., is taking figures on a rock-crushing outfit.

Building contracts have been let for the new roundhouse and shops of the Northern Pacific Railway at Centralia, Wash.

The Snake River Power Company, recently incorporated at Boise, Idaho, will commence work this summer on a large hydro-electric and irrigation project.

The Crane Falls Power Company, Caldwell, Idaho, has ordered a Worthington pumping outfit amounting to $20,000 to be used in irrigation development on the Snake River.

The Wheeler Lumber Company is working on plans for a sawmill of 150,000 ft. per day capacity to be located near Astoria, Ore.

The Hammond Lumber Company is preparing to open a new logging camp with a two-mile railroad near Ranier, Ore.

The American Mfg. Company, succeeding the Moffett Patent Mfg. Company, has bought out the plant of the American Brass Works, Spokane, Wash., which will be enlarged and remodeled for the manufacture of irrigation pumps.

The Board of Public Works, San Francisco, Cal., will receive bids April 24 for substation equipment for the Geary street municipal railway. The same board received bids April 10 for motors and turbine pumps for the Ashbury Heights tank of the auxiliary water system.

The Los Angeles Pressed Brick Company, Los Angeles, Cal., is preparing to spend about $60,000 in additions to its plant at Richmond, Cal.

Texas

AUSTIN, TEXAS, April 13, 1912.

Beneficial rains have fallen in every part of the State. In western Texas the precipitation was unusually heavy and has added materially to the brightness of business prospects. The demand for machinery and tools continues good and dealers are well satisfied with existing trade conditions.

The City Water Power Company, Hartford, Conn., has been granted a permit by the Secretary of State to do business in Texas. The company was recently organized for the purpose of carrying out the contract that was entered into between the city of Austin and the Hydraulic Properties Company, of New York, for the construction of a dam across the Colorado River here and to install a hydroelectric plant. The new concern has a capital stock of $200,000. H. B. Freeman, Jr., of Hartford, is president, and Charles F. Roberts, of New Haven, Conn., is secretary. Frank S. Taylor, engineer, is the Austin representative of the company.

The recent election on the proposition of issuing $10,000 of bonds for the construction of protective works along the Rio Grande, between Washington Park and Ysleta, in El Paso county, resulted favorably.

The Airless Tube Filler Company, San Antonio, has been organized for the purpose of manufacturing a substance for filling automobile tires, inner tubes, etc. The incorporators are D. R. Fant, J. J. Mahoney and Ed. H. Wicks.

The Merchants' Compress Company, Houston, will greatly enlarge the capacity of its cotton compress in that city, erect new warehouses and add to its yard facilities.

The City Water & Light Company, Anson, has been organized with a capital stock of $10,000. The incorporators are A. W. Johnson, J. A. Harris, B. F. Goodwin and J. W. Skinner.

The Texas Traction Company, Fort Worth, is considering the question of constructing a dam across the Washita River in Oklahoma and the installation of a hydroelectric plant to provide power for operating its lines.

F. W. Johnson, president of the Pecos Land Company, Pecos, has applied to the City Council of that town for a 50-year franchise for a sanitary sewer system he purposes to construct there. The city is to have the option of purchasing the system at the expiration of ten years.

The Teague Cotton Oil Company has been organized at Teague with a capital stock of $40,000 for the purpose of erecting a cotton-seed oil mill at that place. The officers are: S. E. Tucker, president; John Riley, first vice-president; A. T. Watson, second vice-president; G. P. Barber, secretary and general manager; H. G. Alexander, treasurer.

The State Penitentiary Commissioners of Texas are erecting at the penitentiary at Rusk, a box and crate factory at a cost of about $20,000. The buildings will be equipped with modern box and crate-making machinery.

The Texas Canning Company will install a canning factory at Jacksonville. A site for the proposed plant has been leased. A. Byrd, of Rogers, Ark., is at the head of the company.

Morton T. Smith, proprietor of the Elgin Brick Company, Elgin, will establish a brick-making plant at Hoyt.

H. F. Westervelt, president of the E Z Open Bag Company, Decatur, Ill., and associates will establish a paper bag factory at Orange, Texas, at a cost of about $175,000. The factory will have a daily capacity of five tons of paper. It is planned to have the new paper bag factory finished and in operation by August 1, 1912.

The Knox Lumber Company, which is constructing a railroad between Bronson and Hemphill, will establish a large lumber mill near the latter place.

The Farmers' Gin Company will install a cotton gin at Georgetown, to cost $5,000.

The Artesia Canning Company, Artesia, N. M., has been organized with a capital stock of $10,000 for the purpose of installing a canning factory. The incorporators are S. W. Gilbert, E. B. Kemp, U. P. White, J. J. Clarke, Walter M. Daugherty, all of Artesia.

The new municipal electric light plant at Sinton has just been finished. G. H. Ferguson is manager.

E. A. Washburn, of San Simon, will bore a number of wells in the San Simon valley of Arizona. Pumping plants will be installed and the water used for irrigation purposes.

William T. Leek, of Ontario, Cal., and associates are having surveys made and plans prepared for a large system of irrigation which they will construct in the valley of the Humaya River, in the state of Sonora, Mexico.

The Tepic Agricultural Company is making arrangements to construct a large system of irrigation near Santiago Ixcuintla, Territory of Tepic, Mexico. The company owns about 165,000 acres of land and the system of irrigation will water about 50,000 acres of this tract. Under the terms of the concession granted it by the Mexican Government the company is permitted to import the machinery and material necessary for the proposed works free of duty.

Robert Graham and associates expect to begin the erection of a meat-packing plant at Cajeme, state of Sonora, Mexico, in a short time.

Eastern Canada

TORONTO, ONT., April 13, 1912.

Floods of almost unprecedented volume have done damage to bridges, dams and some factories on the principal water courses of Ontario and have caused considerable interruption of traffic. The bad condition of the country roads has also been a check to the strong trade movements of the opening spring. The coal supply is short, and in consequence many factories have to feed it sparingly in order to obviate the necessity of a complete shutdown. But these drawbacks are regarded as temporary. The floods have subsided, the roads are improving and the coal supply is being replenished. Unquestionably, the forces of trade are hard to curb. It is seldom that the end of winter finds business in such a state of vigor and buoyancy. If prospects are realized the business of 1912 will exceed that of any former year. The money is stored to maintain in full activity the great railway building enterprise of this year, and that enterprise will support an enormous in-

dustrial business; also the farmers have a very large reserve of their produce to turn into cash and employ on purchasing account. Further, the influx of well-to-do immigrants is larger than ever. Notwithstanding the floods, the coal shortage and the bad roads, there is much complaint about the lack of labor. Some of the conditions of the Immigration law are being waived in order that the labor supply may be recruited from outside.

The machinery to be used in the construction of the Canadian Northern Railway Company's double-track tunnel in Montreal is to be of Canadian make, as far as possible.

The Dominion Government is about to call for tenders to construct a large dry dock at Quebec City.

The Toronto City Council has approved the construction of the following waterworks: Two 36-in. mains; a number of 42-in. mains; two 15,000,000-gal. triple-expansion pumping engines.

The Hunt Milling Company, London, Ont., is remodelling its plant and putting in new machinery.

The Columbus Rubber Company, Montreal, has taken over the Corona Rubber Company of that city and proposes to make extensive additions.

The Fisher Body Company, Detroit, is preparing to manufacture automobile bodies in Walkerville, Ont.

The Hamilton Bridge Works Company has under consideration a project to add a structural steel extension in the east end of the city.

The Davis Leather Company, Newmarket, Ont., has awarded the contract for constructing its new plant at Stratford, Ont., the cost to be $164,000.

The Ogilvie Flour Mills Company, Montreal, is building a warehouse, flour mill and elevator at Medicine Hat, Alberta, to cost $500,000.

The Windsor Brass Mfg. Company, Windsor, Ont., will add power plant equipment.

The Dominion Linen Mfg. Company proposes to remove its plant from Bracebridge to Guelph, Ont. About 200 hands are to be employed.

The Fort William Coal Dock Company, Fort William, Ont., is increasing its capital stock from $200,000 to $500,000. Additions will be made to the generator equipment in the power house.

The Ontario & Manitoba Flour Mills, Ltd., has completed its mill at Sudbury, Ont. The mill will have a capacity of 2000 barrels per day.

The contract to build a steamer for the Northern Navigation Company has been awarded to the Western Dry Dock & Shipbuilding Company, Port Arthur, Ont., the cost to be about $750,000.

The ratepayers of Chatham, Ont., have approved the by-law granting privileges to the St. Mary's Machine Company, St. Mary's, Ohio, which proposes to establish a plant in Chatham.

The Keystone Transportation Company, Montreal, has placed with the Collingwood Shipbuilding Company, Collingwood, Ont., an order for the building of a canal steamer.

The Interlakes Lines, Ltd., is the name of a corporation that has recently been chartered by the Dominion Government, with a capital stock of $2,000,000. Its principal place of business is to be Hamilton, Ont.

The Foster Armstrong Piano Company, which has a branch factory in Berlin, Ont., proposes to build a new one there and increase the number of employees by nearly 100 per cent.

Negotiations have been begun for the planting in Belleville, Ont., of a branch of the Ohio Motor Car Company's works. The local company would have a capital stock of $200,000.

The works of the Brown Copper & Brass Rolling Mills Company at New Toronto, Ont., were destroyed by fire this week, the total loss being $125,000. The loss is fully insured and the plant is to be rebuilt at once.

The plant of the Standard Iron Company, Deseronto, Ont., was damaged by fire April 7. The elevator, engine room, storehouse and boiler room were all gutted, and as a result 75 men will be thrown out of employment for a time. The loss was $50,000, partly covered by insurance.

The Hamilton Facing Mills Company's plant, Hamilton, Ont., was damaged by fire April 7.

The Dominion Government has called for tenders for the new St. Lawrence drydock, the largest in the world, to be located either at Quebec or Levis. Tenders close on July 2. The dimensions of the drydock will be 1,150 ft. long, 137 ft. wide and 37 ft. deep.

Announcement is made of a big extension involving four new buildings by the American Radiator Company, Brantford, Ont. The Canadian manufacturing headquarters of the company will be permanently established there.

The Dominion Wire Cloth & Mfg. Company, Ltd., Ottawa, Canada, recently mentioned as having a plant in course of erection, states that it has purchased a portion of its equipment but will need several dynamos, some machine shop equipment and a boiler for heating purposes. The plant is expected to be completed July 1 and at that time other machinery requirements will be considered. John R. Buchanan, Appleton, Wis., can be addressed.

The Brantford Oven & Rack Company, Brantford, Ont., which is completing a factory building, will manufacture steel sectional bake ovens and all kinds of sanitary bakers' appliances. The company will also manufacture ventilators for buildings under a royalty arrangement with the Kerchen Ventilator Company, Chicago. Most of the machinery required for the equipment of the factory has been purchased.

Robert Scott & Son, Ltd., Galt, Ont., will build at River Park, a plant of four buildings for the Victoria Wheel Works, which will be 100 x 230 ft., 30 x 230 ft., 100 x 100 ft. and 40 x 50 ft., respectively, of stone and brick construction.

The Benjamin Electric Mfg. Company, Toronto, Ont., has let contract for a two-story brick factory to be erected on York street, to cost $25,000.

March & Henthorne, Belleville, Ont., are having plans prepared for a new foundry and machine shop.

The McGregor & McIntyre Company, Toronto, Ont., will erect a building 140 x 400 ft. on Shaw street, to be equipped and used for the fabrication of structural steel.

The Montrose Paper Mills, Ltd., has completed plans for a three-story paper mill to cost about $180,000. D. J. Albertson, 305 East Main street, Kalamazoo, Mich., will receive bids.

The Canada Steel Goods Company, Hamilton, Ont., will build a structural steel addition, 80 x 100 ft., one story, to its plant.

The Canadian Shovel Company will build a 60 x 100-ft. factory addition of steel construction, for which plans have been completed.

Western Canada

WINNIPEG, MAN., April 11, 1912.

The weather throughout western Canada is now quite spring-like, and unless a change occurs in climatic conditions planting will be general before the end of another week. The ground is reported to be in good condition, and the outlook is stimulating to the commercial and industrial situation. Every week sees steady increase in building activity, and the contractors are now busy on plans and contracts.

A company has been organized in Winnipeg under the name of the F. J. Wellwood Company, Ltd., with a capital stock of $300,000, to build a paper mill and cardboard factory in Elmwood, a suburb of Winnipeg.

It is announced this week that the manufacturing plant of the Copp Stove Company, Fort William, will be enlarged considerably this summer.

The Canadian Pacific Railway Company has announced that it will erect a 1,000,000 bushel cleaning elevator at Fort William.

The Matthews Packing Company is preparing to erect a cold storage and refrigerator plant at Fort William.

The International Milling Company, New Prague, Minn., will increase the capacity of the plant of the Calgary Milling Company, Calgary, Alberta, which it recently purchased.

The Regina Cold Storage Company is building a plant at Regina, Sask., that will be one of the most modern in the country.

The owners of the Silver Hoard Mine at Ainsworth, B. C., intend erecting a small sawmill to cut ties, mine props, etc.

Brown & McKay, Vancouver, B. C., have secured a site for a sawmill at Parkview, Coquitlam, B. C. They propose to erect a plant that will have a capacity of 20,000 ft. of lumber and 30,000 shingles daily.

It is said that the Lester W. David Lumber Company, Ltd., Ocean Falls, B. C., will establish a sawmill and planing mill at Prince Rupert, B. C.

The Okanagan Falls Lumber Company, Ltd., Okanagan Falls, B. C., has been incorporated with a capital stock of $25,000 to carry on business as sawmill proprietor, general lumber and timber dealer.

McDougall & Jenkins, Vancouver, B. C., formerly connected with the North Vancouver Iron Works, are erecting a new plant at Coal Harbor, Vancouver, for the manufacture of boilers.